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A Personnel Education Program in the Department of Health*

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TRAINING for service in public health has expanded enormously in the past 4 years. The very term "in-service" training is relatively new to public health. It, therefore, seems appropriate to report, for the benefit of those who are faced with the planning of training programs, the experience of a project in the New York City Department of Health which has for the past 2½ years attempted a fairly extensive program of in-service training for its employees. Moreover, the educational experience gained in conducting an in-service training program may be of value to those persons in academic institutions who are building curricula for students of public health.

BACKGROUNDS FOR STAFF EDUCATION

The success of any organization is dependent not only upon progressive leadership but on the qualifications, attitudes, and interests of all of the members of its staff. There has always been a natural tendency for employees long in service, particularly those in positions involving routine duties, to settle back in the harness, doing the day-to-day work but losing the drive and initiative often brought to a job by the newcomer who looks to the future. If a health department is to maintain its efficiency, deliberate steps must be taken to counteract the dullness of unchanging routine, to broaden horizons of interest, to re-instill the desire to mold the future, and to establish enthusiasms which mean a ready and willing acceptance of change when change means more effective work.

This is true of any large organization but particularly true of health departments. Public health in itself is hardly an independent science but one nurtured by many disciplines. Its foci of activity change from decade to decade, and the methods by which it attempts to reach the same objective may change even more frequently. It is imperative, therefore, for the administrator to have a flexible staff, one sensitive to changing

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conditions which may indicate the development of different procedures—a group which is willing and anxious to experiment with new technics instead of blindly following old patterns—a staff which grows with the times. Employees with potentialities for creative work are found in every organization but their enthusiasm often has been dulled and their talents crippled by traditional authority and routinized methods of work. A mere change in point of view may release energies and convert intrinsic talents to greater use.

It is common experience that an educational project may stir many employees to increased activity and development. But the administrator must choose the pattern which such a venture will take. Selecting a few persons for intensive training and trusting that the inspiration thus gained will act as leaven for all is a simple and often effective method of staff training. Organizing "refresher" or "short courses" in which many employees are rehearsed in the rudiments of their professions is another popular device. Or these "rehearsals" may be scheduled as a part of routine work, the administrator or the group choosing certain topics to be studied for the year and devoting a part of each regular staff meeting to them. Some organizations have also found it profitable to have a central staff to which responsibilities for staff education are delegated.

What to teach and how to teach it will be critical problems for every in-service training project. The alert administrator may know exactly what his staff needs but many useful suggestions come from staff members themselves. Certain educational leaders have found it useful to determine the desires and experiences as well as to secure the advice of each group for which any training activity is designed before the program for that group is planned. If the employee finds the problems which exist in his own work and assists in planning what he needs to solve those problems, the program of staff education is firmly rooted because it becomes a part of the employee's own thinking and activity.

There are other reasons why such a policy seems desirable. The public health program of today is less and less one of police control and more and more one of health service and education. To close an infected well is a different job from teaching a mother dietary hygiene, and demands a different approach. In the former it was possible to follow a rigid set of regulations but the latter demands that the public health worker secure the coöperation of his client in order to educate him. He, therefore, needs to use imagination and discrimination. Staff training, if effective today, must assist the employee in making such adjustments in his own approach to those he serves that he becomes a teacher and not a police officer. Group participation in the determination of objectives and methods of training is imperative in an educational program for employees who have been long in service.

Many times it is not technical training which an employee seeks but help in how to "put over" what he already knows. How can the nurse who knows the reasons for diphtheria immunization persuade a skeptical mother? How can the health officer preside more effectively over various kinds of meetings? What are the most useful kinds of reports from an investigation of a smoke nuisance?—from a visit to the home of a tuberculous patient? These are common problems of procedure which are in the day's work of the health department employee and an educational project must find ways of helping to meet them.

The New York City training project was begun under the direction of Dr. H. E. Kleinschmidt with a small cen-

tral educational staff whose duty it was to plan and execute an educational program with the assistance of the department's administrators. Many methods of staff training have been utilized. To describe them is impossible within the time limits prescribed and, moreover, those interested can refer to the more lengthy monograph which has just been prepared. Here I shall only comment on our methods of procedure and the conclusions we have reached concerning certain methods of training commonly employed.

The staff soon discovered that the department personnel could be divided into specific categories—central administrative staff, district health officers, physicians, x-ray technicians, nurses, statisticians, office workers, etc. The same type of assistance was often requested by small groups in more than one administrative unit. Statisticians, for example, were employed in 5 bureaus and had the same kinds of problems. Moreover, certain courses appealed to more than one group of specialists—group discussion leadership was equally applicable to supervisors of nurses and food inspectors. It was finally decided that to build a curriculum around the specific needs of small groups of employees was more profitable than expending energy on general courses in various branches of public health for large groups.

SPECIFIC OBJECTIVES OF THE STAFF TRAINING PROGRAM

In accord with the basic philosophy which has just been outlined, and in consideration of other problems which were found in the department, the objectives of the project were finally outlined by the educational staff as follows:

1. To encourage the professional advancement of certain employees through grants of scholarships and tuition fees which enable them to study in recognized universities or schools of public health.
2. To help broaden the horizons of selected administrators and technical workers through visits to departments and institutions outside of New York.
3. To encourage continuous study by employees by offering them courses conducted within the department, using department personnel for teaching when available, and drawing upon other leaders when necessary.
4. To set up experimental and teaching centers where departmental workers might coöperate in developing specialized services and in testing the effectiveness of routine procedures. These centers would ultimately be coördinated with the department's adopted plan of developing teaching centers in connection with local medical schools.
5. To arouse a greater appreciation of public health work among all employees of the department by acquainting them with outstanding problems of public health, as well as the purpose and function of their own department; and to develop an esprit de corps.
6. To find ways and means of discovering latent leadership in the department and to develop it in such a way that both the individual and the department profit.

FELLOWSHIPS AND SCHOLARSHIPS

Thanks to Social Security Funds, we probably have all had sufficient experience with sending employees away for a full year of postgraduate study, to realize that the chief problem with this method of training lies in the selection of the recipient of the fellowship. It is also an expensive process, but will continue to be an essential part of any training program.

Organizing special courses in local institutions has sometimes been a very satisfactory educational tool. Small groups of food and sanitary inspectors have had a special course in the fundamentals of sanitary science particularly adapted to their needs. For physicians working part-time in the department's tuberculosis diagnostic service a clinical course in the wards of Bellevue Hospital was developed. In sharp contrast to the success of this course was one developed for the medical staff working in child health stations. The point of view of the teaching staff trained in instructing private practitioners of pediatrics was not useful to our physicians working

in preventive pediatrics in department clinics with children from the homes of lowest economic level.

THE INTRAMURAL COURSE

A variety of intramural "in-service" training courses have been developed. In each instance the employee's administrative officers have agreed that the contemplated course was desirable and have often participated in presenting some phase of it. Many courses have been developed at the suggestion of the employees for whom they were conducted and no courses have been planned without the advice of the group concerned. Some have consisted of only a few sessions and others have continued throughout a year. More than 1,800 students have been enrolled—some in several courses, others in only one.

Instructors have been selected from department ranks, from medical schools, schools of social work, voluntary health agencies—anywhere that well recognized leaders in a given specialty could be found. We have found it necessary to spend some time with each instructor, telling him of the problems which department employees have suggested they want discussed in the prospective course. We have been surprised how often men well qualified in a given subject are, however, unaware of what a health department's limitations, problems, or needs may be. The strictly academic point of view of some able teachers has sometimes inhibited their usefulness.

Many kinds of courses have been given—"refresher" courses in infectious diseases, food chemistry, the interpretation of roentgenograms in children, methods of group discussion, public speaking, report writing, medical German for laboratory specialists, Spanish for nurses working in a Puerto Rican district, backgrounds in public health for statisticians, mycology, and so on—each course built up around the needs of a small group. A member of the Bronx Zoo staff talked on the care of laboratory animals for animal caretakers; a teacher from the telephone company traced inefficiencies of department telephone service and courtesy; Dr. Eduard G. Lindeman, well recognized leader in the field of social relationships, discussed the rôle of the public servant under present-day conditions with a group of food and sanitary inspectors, and at another time with a group of district health officers.

Sometimes members of the central educational staff have been solely responsible for instruction. The instructor in nutrition, for example, has worked with groups of about 15 nurses at a time and in a series of 3 to 6 conferences on the basic principles of nutrition, the most effective utilization of home relief allowances, thrift buying, low cost foods, and the national and religious dietary customs—all subjects pertinent to the everyday work of the public health nurse. Each group met in the local district where the nurses worked. The content was adapted to the group and was presented in terms of assisting the nurse to meet the nutritional problems she met in her families. It soon became evident that the physician too would need to understand something of food costs, for if he prescribed an expensive formula, the diet for the rest of the family was jeopardized. Therefore, a few sessions on food costs were introduced into the child health center teaching program, and certain mimeographed materials were prepared for distribution by the division administrator to the entire staff.

Evening classes in commercial subjects and public speaking were given at no expense to the department with the aid of the WPA Adult Education project. Medical dictation was stressed—even the food inspector brought in his daily report as his English lesson.

Another successful method of training was the exchange service developed with

local medical schools. Here the hospital pediatric department sent members of the staff out to work in baby health stations and our staff went into the outpatient clinics and wards of the teaching hospital. We feel strongly that a closer liaison between hospital and public health personnel is desirable, and by another means have attempted to promote interchange. For example, all physicians from health department prenatal clinics worked for a time under the direct supervision of leading obstetricians of the city Obstetric Advisory Council—and were then "approved" by the professional leaders in the community. At another time the County Medical Society arranged that a contagious disease hospital give bedside instruction to small groups of school physicians.

In general, it seems possible to draw a few conclusions on the subject of the special course. A course is successful and accepted by the employee only as long as it seems useful to him in his daily work. Valuable suggestions on content will come from the employee himself. The informal course with abundant opportunity for well guided discussion based on day-to-day problems is often more effective than the formal lecture course in which the same material may be presented. It is necessary to study carefully the backgrounds of the group to be served before instruction is begun. There are many sources in the community which may be tapped for valuable educational assistance.

THE TRAVEL FELLOWSHIP

We have had a limited experience in sending employees out to see others working at similar jobs. Certain administrative officers and laboratory experts have been sent, each to a specific center and usually for from one to two weeks. From this experience we have gained the following impressions of this method of training:

1. Visiting other health departments may be a valuable method of staff training but its use is limited.
2. The benefit derived will vary greatly with the individual sent.
3. The trip needs to be carefully planned before the traveller leaves. It is wise to visit only one center and one with problems similar to those the employee faces at home.
4. Sufficient leisure for close observation of details in the field is to be preferred to days crammed with interviews with many persons.
5. Technical workers probably benefit more than administrative officers.
6. Certain definite objectives should be outlined before the traveller leaves and a comprehensive written report should be required of him on his return. This should not be a chronological account of what was seen—but an evaluation which should bring out contrasts to and suggestions for the work at home.

TEACHING CENTERS

Perhaps the most valuable teaching technic used for improving the quality of service rendered in a particular branch of work has been the development of the teaching or experimental center. By this is meant a typical unit of service which can be used for teaching the employee while he is actually on the job. It has been found better to term this an "experimental" instead of a "teaching" center. The employee then comes to the center as a part of an experiment—an experiment in which the new methods and technics are being tested—an experiment in which he and the teacher both participate.

From our experience in three such teaching centers (child health, school health, and public health nursing) we feel that such a center is a valuable tool not only in teaching the employee but in developing improved routines for department service. It seems easier for a person employed to perform a given task to see the flaws in his own technic and in his approach to his work if he gets away from his own work bench. However, if what he is to learn is to have meaning he must be given a work bench and tools similar to those with which he is usually equipped, and must

be given freedom and leisure to experiment with them. If he can be made to feel that he is part of an important venture in which he may be a valuable cog in working out a new program he will probably drop old attitudes and look around for improved methods of solving his difficulties—and this, we feel, is a most important objective of in-service training.

GENERAL HEALTH EDUCATION FOR STAFF

It has been a part of the project's philosophy that to arouse an appreciation of public health among all the employees of the department and to acquaint them with department activities is a legitimate part of staff training. Each of our employees represents the department to his own circle of friends and to him are often referred questions of health. Is diphtheria immunization dangerous? Where can one get a Wassermann test? Do colds cause pneumonia? If well informed, he may become a useful health educator—but the department had never made any particular effort to instruct him. If everyone knew of department activities and objectives, there might also develop a greater esprit de corps and a better quality of work.

Three media were found useful. The first was a bi-weekly house organ, a single mimeographed sheet signed by the Commissioner, distributed with pay checks, carrying some message on public health to all employees. The second was the lunch-time meeting at headquarters — continuous programs each Thursday noon — so the employee could drop in for half of his lunch period for the exhibit, movie, discussion, demonstration, or lecture which was on the program. Interest in these popular programs developed rapidly, and in two winters there has been an attendance of 24,430. The package library, in which are duplicate sets of selected pamphlets or small books on various health topics, has also proved successful, but only when an active promotional campaign accompanies the release of each new library.

THE STAFF MEETING AS AN EDUCATIONAL TOOL

A common vehicle for staff education is the regular staff meeting. One member of the educational staff in the Bureau of Nursing* has made an extensive study of the staff conference and, having developed certain technics of observation, has come to conclusions concerning the use of the staff meeting in education or in the development of leadership. It must be noted that we have considered it a misnomer to call a meeting of field workers and their chairman a staff conference if the order of business includes merely the giving out of orders, distributions of supplies, or checking up on record-keeping discrepancies. Our experience in attempting to use the staff meeting as an educational tool has lead to these conclusions:

1. It is important that there be intensive and individual guidance in training those who will lead staff conferences.
2. The readiness of the individual for guidance is an important factor in determining the course of development and in judging the rapidity of improvement.
3. The individual's special needs and interests must be considered.
4. Continuous encouragement and constructive criticism are essential.
5. The staff first should become thoroughly familiar with some of the simpler practices of the discussion method before any attempt is made to give guidance in the more intangible skills of leadership, especially those that are dependent upon psychological insight.
6. The specific procedures most readily accepted and most successfully applied in our experience were:
   a. The use of an agenda
   b. The introduction of the topic for discussion with a concise review of the issues involved
   c. Summarizing the pertinent points at frequent intervals during the conference

* Miss Bertha Jenkins, to whom the author is indebted for these remarks.

d. Use of visual aids in presenting materials, such as Isotype charts, record forms, movies

7. The development of effective staff conferences is a difficult procedure but an effective method of training personnel.

ADMINISTRATIVE PROBLEMS

In any organization the problems of administrative management become increasingly important as the organization becomes larger. Moreover, there is an additional problem when professional personnel—doctors, engineers, architects—are concerned. Medical personnel in a health department, for example, need the active support of an intelligent and a flexible set of administrative policies if they are to produce a high quality of professional service and if they are to continue to grow in their profession. It is herein that a public service meets with difficulty. There would appear to be a kind of hardening of the administrative arteries in the public service that encourages stagnation. It sometimes seems as if more good physicians are lost to the cause of public health because of dissatisfaction with the professional conditions of their employment than because of the salaries available.

It, therefore, becomes important for any staff education project to be sensitive to those administrative procedures which discourage rather than encourage a high quality of service. It is probable that every educational project will be asked to assist with administrative problems, will uncover weak links in procedures, and be confronted with problems of personnel management. We have in some instances been able to base training programs on the results of detailed studies of administrative policies and have been unusually pleased with the results. And this year we are experimenting with another method of attacking this need for assistance in the administrative field. We have added to the central staff a specialist in public administration, hoping to discover what public health administration can learn from that specialty.

IN CONCLUSION

In conclusion, 2½ years of experience with an intensive program of in-service training for a municipal department of health has shown that there must be wide experimentation with various educational technics—and that a flexible program must be established. Much can be done to change attitudes and improve quality of service, but didactic methods seldom achieve these ends. The educational venture which attacks specific problems in department service in a realistic manner and which allows generously for employee and supervisor participation will not only be sought out by the employee but give greatest returns to the department.

TABLE 1

In-Service Training Courses Organized to Meet Specific Requests and Needs of Groups of Health Department Employees—January 1, 1937–June 30, 1939

Name of Course	*For Whom Designed*	*Description of Course*	*Instructors*	*Number of Sessions Held*	*Average Attendance per Session*	*Remarks*
New Advances in Infectious Diseases	Epidemiologists	Lectures on influenza, measles, pneumonia, rabies, amebic dysentery, diphtheria, poliomyelitis, meningococcic meningitis, tularemia, leprosy, epidemic diarrhea of the new-born, with adequate time for questions	Outstanding experts on each subject from New York City, U.S.P.H. Service, etc.	11	40	On employee's time. Some physicians of other bureaus also attended

TABLE 1—(Cont.)

Name of Course	*For Whom Designed*	*Description of Course*	*Instructors*	*Number of Sessions Held*	*Average Attendance per Session*	*Remarks*
Modern Problems in School Health	School physicians and health officers	Lectures and discussions on various pertinent topics, normal growth and development of school children, health education, child psychology, childhood tuberculosis, nutrition, endocrinology, cardiac and orthopedic problems, venereal disease, pneumonia	Department leaders and authorities on particular subjects from outside	26	175	Attendance on department time during school vacations. Planned partially to use up this time and to build morale. Supplemented by small group meetings as well
Newer Knowledge of Human Diseases Acquired Through Animals	Veterinarians	Lectures and discussions on trichinosis, anthrax, undulant fever, food poisoning, tularemia, and psittacosis	An outside expert	6	29	On employee's time
Interpretation of X-rays in Children	Physicians—particularly those in schools and child health stations	Lecture and practical clinics on X-rays in children	Training staff instructor and outside lecturer	12	10	On employee's time. Course of 4 sessions repeated 3 times
Obstetrics — A Refresher Course	Physicians in charge of prenatal clinics	Practical work in hospital prenatal clinics	Chief of hospital clinics selected by Advisory Obstetric Council	Depended on Trainee	7	Each physician to be trained worked in clinic until approved or rejected by its chief. Both employee and department contributed time
Contagious Diseases Refresher Course	School and child health physicians	Clinical bedside sessions in a contagious disease hospital	Hospital staff	6	67	On employee's time. Enrolled through County Medical Society
Pediatric Clinics	Physicians in child welfare clinics	An exchange of externe service in an academic pediatric out-patient department	Academic pediatric staff	1 month service	28	28 health department physicians spent 1 month each in academic departments. In summers, usually on department time
Modern Problems in Child Care	Physicians in child health stations	Lectures and discussions on infant diarrheas, behavior problems, normal infant growth and development	Experts — department and outside	4	79	On department time—vacation or Saturday Institute
Health Officers Seminars	District health officers	Seminars on epidemiology, maternal and child health, public relations, health education, and department administration	Experts from outside New York City, Schools of Public Health, and Department	11	25	On department time
Backgrounds for the Public Health Dentist	Dentists	Lectures and discussions on various phases of public health, dentistry, nutrition, child psychology and education	Department leaders and outside experts	29	80	Attendance voluntary, on employee's time. All lectures mimeographed

TABLE 1—(Cont.)

Name of Course	*For Whom Designed*	*Description of Course*	*Instructors*	*Number of Sessions Held*	*Average Attendance per Session*	*Remarks*
Bacteriology of Food and Water	Laboratory technicians	Lectures and discussions	Head of this division in the department	4	25	On employee's time
Chemistry of Food and Food Products	Laboratory technicians	Lectures, recitations, and demonstrations. Practical aspects of analyses used in food control.	Department expert	23	15	On employee's time
Care of Laboratory Animals	Animal keepers in laboratories	Lecture and discussion on feeding, ventiliation and general care of certain animals	Expert from Bronx Zoo	1	15	On department time
Mycology	Laboratory technicians	Lectures and discussions	Dr. Fred D. Weidman, Univ. of Pennsylvania	5	75	On department time
New Advances in Immunology	Laboratory workers	Lectures and discussions	Outside specialists	10	100	On department time and part employee time
Statistics	Statistical clerks and laboratory workers and administrators	Lectures and discussions — divided into two classes depending on background	Instructors from school of public health	36	18	On own time, 2 hour sessions — advanced class 20 sessions, other class 16
Interpretation of Statistical Material	Nurses	A simple course in backgrounds of statistics and vital statistics	Outside specialist	16	8	On own time, 2 hour sessions
Rodent Control	Sanitary and food inspectors	Lectures followed by field trips with individuals or small groups	Expert from U.S.P.H. Service	30	48	Time varied with groups—on department time
Chart Making	Statistical clerks and employees making charts	Demonstrations and laboratory work with all students making a chart	Dr. J. H. Watkins, Yale School of Public Health	4	18	4 afternoons on department time
Public Relations	Health officers	Seminars as backgrounds of sociology and psychology that influence our public relations	Eduard Lindeman, School of Social Research	6	30	On department time
X-Ray Technics	X-ray technicians	Lectures, demonstrations, and laboratory exercises in X-ray technics, anatomy, physiology and physics useful to the X-ray technician	Department experts and outside leaders	30	40	Held in conjunction with the Society of Municipal Radiographers — on employee's time
Technics of Group Discussion Leadership	Supervisors of food and sanitary inspectors	Topic of discussion was "human relations in government service" and thereby the instructor demonstrated methods of leading group discussion	Eduard Lindeman, School of Social Research	6	20	Department contributed half, and employee half of time
Backgrounds in Public Health	Statistical clerks	General backgrounds of public health problems	Professors of public health, department leaders, training staff	16	22	Employee contributed half time, department half

TABLE 1—(Cont.)

Name of Course	*For Whom Designed*	*Description of Course*	*Instructors*	*Number of Sessions Held*	*Average Attendance per Session*	*Remarks*
Medical German	Laboratory technicians	Medical and scientific German beginners	WPA instructor	not recorded	not recorded	On employee's time
Spanish	Nurses working in Puerto Rican district	Sufficient speaking knowledge of Spanish to assist nurse in taking history, making home visits, etc.	WPA instructor	14	23	Employee contributes half time, department half
Principles of Nutrition	Nurses	Group discussions on principles of nutrition and family budgeting	Training staff expert	104	10	Does not include conference classes at Training Centers, Kips Bay
Orientation Course	Secretaries, stenographers and selected clerks newly appointed	Organization and objectives of the department, telephone courtesy, office management and informational service	Department experts and teachers from the telephone company	6	88	On department time. Three sessions repeated each year. First year an attempt was made to reach old employees. Second year, new employees
Voice Culture	Secretaries	Voice culture	Telephone company expert	3	46	Individual instruction and suggestion
English and Vocabulary Building *	Clerical staff, nurses, inspectors	Meanings of words necessary to build vocabulary for everyday use, medical usage, etc.	Adult Education Project (WPA)	92	126	Night sessions on employee's time. Meets in 4 sections
Report Writing and Advanced English Composition *	Food and sanitary inspectors, nurses and clerical	Writing effective reports, articles, letters	"	68	86	Night sessions on employee's time. Meets in 4 sections
Filing and Office Practice	Clerical	Modern filing systems; clerical and secretarial duties and office appliances	"	64	12	Night sessions on employee's time. Individual instruction
Typewriting *	Clerical staff	Graded classes for beginners as well as advanced students: Medical drill, statistical typing, stencil, etc.	"	166	37	Night sessions on employee's time. Meets in 4 sections
Civil Service Review *	Clerical staff	Civics, arithmetic, English, mental alertness	"	146	117	Night sessions on employee's time. Meets in 4 sections
Shorthand *	Clerical and others	Graded classes for beginners and advanced students in both Pitman and Gregg; medical dictation, speed work	"	352	124	Night sessions on employee's time. Meets in 8 sections
Business Arithmetic	Clerical staff	Theory and problems in business arithmetic as adapted to municipal service	Adult Education Project (WPA)	82	13	Night sessions on employee's time. Meets in 2 sections
Public Speaking	Physicians, nurses, administrators	Some theory, largely practice with individual criticism of delivery, etc.	" and private teacher	39	53	Night sessions of 2 hours each. Met in 5 sections

* Statistics for course include 2 semesters with courses repeated in each.

Method for Determining the Effect of Chemical Antisepsis on Phagocytosis*

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THE routine procedure for testing the germicidal power of a compound by noting its effect on staphylococci or *Eberthella typhosa* and comparing the results with those obtained with phenol on the same organisms definitely has its place in determining disinfectant action on non-living material. Although the phenol coefficient method indicates the greatest dilution of the test substance capable of killing the organism used, it gives no information concerning the toxicity of this dilution for living tissue. The effect of an antiseptic on body tissue is relatively of greater importance than the ability of that antiseptic to destroy living microörganisms.

The method for determining the efficiency of germicidal substances described by Salle,[1, 2] and his coworkers has opened up a new field of study which will be of great importance in the proper evaluation of antiseptics and related compounds. This method is based on a comparison of the killing power of the antiseptic for bacteria with its toxic action toward living embryonic tissue. By combining these two results an index described by the authors as a "toxicity index" may be obtained, and is defined as the ratio of the highest dilution of antiseptic which prevents the growth of embryonic chick heart tissue during 48 hours to the dilution which kills a given test organism in 10 minutes. Theoretically, the smaller the index the more satisfactory the antiseptic. Salle demonstrated in tests on nine germicides that iodine (Lugol's solution) had the lowest toxicity index and mercurochrome and merthiolate the highest.

More recently Bronfenbrenner[3] and his associates described a "Manometric Method" for evaluation of germicides. The authors compare the effect of certain germicides on the oxygen consumption of adult mouse liver cells and of suspensions of *Escherichia coli* to which comparable amounts of protein in the form of horse serum have been added. The depressant effect on the rate of oxygen consumption in glucose-succinate buffer is taken as a measure of destructive action in both cases. Concentrations of disinfectant giving 50 per cent inhibition of the rate of oxygen uptake by *Escherichia coli* divided by the concentration giving 50 per cent inhibition of the rate of oxygen uptake by mouse liver cells results in a "toxicity index."

Both of the above methods focus attention on the proper evaluation of germicidal substances for antiseptic use but neither fulfils the desired require-

* Read before the Laboratory Section of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 18, 1939.

ments of simplicity and ease of manipulation necessary for the routine testing of such compounds. It seems desirable also in determining the toxicity of antiseptics that the tissue used be one closely associated with the protective mechanism of the body.

The mechanism of phagocytosis is an extremely important one in the protection of the host against invading organisms. In simple cutaneous lesions or infected wounds the leucocytes are the first line of defense. These cells not only phagocytize the invading organism after opsonization but as shown by Fleming [4] secrete a powerful bacteriolytic ferment (lysozyme) which acts directly on some bacteria. Fleming [5] further points out in discussing the bactericidal power of whole blood for the ordinary pyogenic bacteria that "the active agents in the destruction of these pyogenic microbes are the leucocytes, and if these are removed (as can be done by simple filtration through cotton wool) the whole of the bactericidal power of the blood is lost." The normal protective mechanisms of the body are only appreciated when we consider the many uneventful contacts that are made daily with potentially dangerous pathogens. Chemical antisepsis should only be used as an adjunct to the normal protective mechanism to augment the natural defenses of the infected host which have been partially broken down by the invading organisms. However, an antiseptic which destroys the normal function of the leucocyte can only have a deleterious effect on an important protective mechanism of the body.

The proposed method depends on the ability of the normal guinea pig or human leucocyte to engulf artificially opsonized staphylococci in the presence of increasing concentrations of the germicidal substances under test. All tests take place in the presence of 40 per cent fresh guinea pig blood.

METHOD

Guinea pig blood—Five cc. is withdrawn from the heart under ether anesthesia into 0.2 cc. of 20 per cent sodium citrate in isotonic salt solution, resulting in a final concentration of 0.78 per cent citrate. The blood should be used for testing purposes within 3 to 5 hours.

Antigen — Staphylococcus aureus (F.D.A. strain 209 *) is grown in Blake bottles on standard nutrient agar of pH 7.2 for 48 hours at 37° C. After checking each bottle for contamination, sufficient physiological salt solution is added to remove the bacterial growth by gentle rocking. Removal of the bacteria is facilitated if, after the salt solution is added, the bottles are placed flat on the bench and allowed to stand for 1 hour. The bacterial suspensions are pooled, measured, and an equal volume of fresh sterile 1 per cent chrome alum (chromium potassium sulphate) in isotonic salt solution is added. Ferric alum (iron ammonium sulphate) or gallotannic acid may be used. The treated suspension is incubated at 37° C. for 2–3 hours and then centrifuged to sediment the bacterial mass. The supernatant fluid is discarded and the bacterial mass washed twice with isotonic salt solution. The bacterial sediment is finally taken up in fresh salt solution using about 10 cc. to 0.4 cc. of bacterial sediment. This constitutes the stock antigen which can be used for at least 1 month. In the test the antigen should be diluted, as described by Feemster [6] and his coworkers, to give a corrected Gates reading of 1.04. This reading corresponds to a bacterial count on the order of 500 million staphylococci per cc. Since the degree of phagocytosis depends to a considerable extent on the

* This culture is maintained under carefully controlled conditions for antiseptic testing purposes in the Food and Drug Administration, Washington, D. C.

antigen concentration, it is necessary that the suspensions be carefully standardized.

Antiseptic—The antiseptic is diluted in isotonic (0.85 per cent) salt solution. The toxicity indices reported are based on the final dilution of the active ingredient of each germicide used.

TECHNIC OF TEST

The antiseptic dilutions are pipetted in 0.1 cc. amounts to the bottom of test tubes measuring 100 x 13 mm. (Wassermann tube). To the antiseptic is added 0.2 cc. of citrated (0.78 per cent) normal guinea pig blood followed by 0.2 cc. of standardized antigen suspension prepared as previously described. After addition of each of the latter two ingredients the tubes are shaken gently and finally stoppered with No. 00 rubber stoppers, which should be carefully treated with alkali and then neutralized to remove materials toxic for blood cells. The tubes containing mixtures of antiseptic, blood, and antigen are placed on a rotating machine in the 37° C. incubator (see Figure 1) and revolved at 4 revolutions per minute for 30 minutes. The rock-

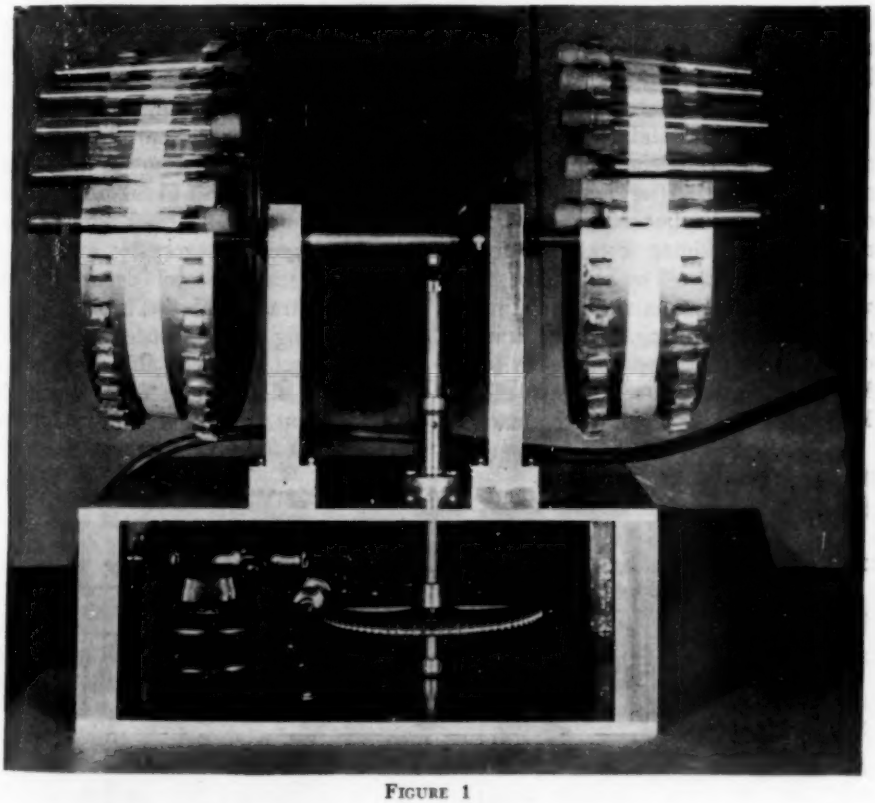

FIGURE 1

ROTATOR—Consists of 2 aluminum truncated cones which rotate at 4 r.p.m. by means of 2 bevel gears and a worm and gear (1:50 ratio). A rheostat is used to control speed further. The inner diameters of truncated cones are ½" greater than the outer, resulting in a slight incline of cone surface. The tubes are held in position by means of brass spring clips which are soldered directly to cone surface. The frame is made of duraluminum. The machine imparts a tilting and rotatory motion to the contents of the test tubes. The rotator is kept in a 37° C. incubator.

ing, rotating motion developed by this machine greatly increases the number of contacts between the staphylococci and leucocytes over that obtained by water bath incubation. The tubes are then removed, portions taken from each with capillary pipettes, and blood smears made in the usual way. The smears are made on glass slides (3″ x 1″) with small drops of material so that they terminate at about three-quarters the length of the slide. The slides should be thoroughly cleansed with a non-scratching cleansing agent and with alcohol before use. The smears should be dried rapidly by a warm current of air. An electric fan with a Bunsen burner placed a few inches behind it or an electric hair drier is satisfactory.

The smears are stained with 0.5 cc. of 1 per cent methylene blue in absolute methyl alcohol. After 1 minute, 1 cc. of distilled water buffered at pH 7.2 is added, and staining continued for 4 minutes longer. The slides are then washed carefully in running tap water, dried without blotting, and the number of staphylococci ingested by each of 25 leucocytes is estimated. Most of the leucocytes will be found at the margins and toward the end of the blood smear. Counts should not be attempted on dense clumps of leucocytes or those partially masked by bacterial aggregates. The degree of phagocytosis per cell is estimated as follows:

No phagocytosis—no organisms engulfed.
Slight phagocytosis — 1–20 organisms engulfed.
Moderate phagocytosis—20–40 organisms engulfed.
Marked phagocytosis—Over 40 organisms engulfed.

As the concentration of antiseptic is increased the amount of phagocytosis decreases until a concentration is reached which completely inhibits phagocytic activity. This concentration (dilution of antiseptic) is referred to as the "toxic endpoint" of the antiseptic under test. Control tests are made with salt solution in place of antiseptic. From 40 to 80 per cent of the leucocytes in normal guinea pig blood markedly phagocytize artificially opsonized staphylococci depending on the concentration of the antigen used. By varying the concentration of staphylococci we were able to demonstrate that fluctuations of as much as 20 per cent "marked" phagocytosis

TABLE 1

Method of Test

1. Mixture: 0.1 cc. antiseptic
   0.2 cc. guinea pig blood
   0.2 cc. antigen
2. Rotated on mixing machine 30 minutes
3. Smears prepared and stained with methylene blue for 5 minutes
4. Degree of phagocytosis estimated

Toxicity of Mercurochrome

Final Concentration of Antiseptic	*Degree of Phagocytosis*			
	Negative	*Slight*	*Moderate*	*Marked*
	Per cent	*Per cent*	*Per cent*	*Per cent*
0	24	10	14	52
1:1,500	100	0	0	0
1:1,600	100	0	0	0
1:1,700	100	0	0	0
1:1,800	100	0	0	0
1:1,900 *	100	0	0	0
1:2,000	80	16	4	0
1:2,300	68	8	8	16
1:2,600	44	20	16	20
1:2,900	20	8	28	44

* Greatest dilution completely inhibiting phagocytosis (toxic endpoint) 1:1,900.

with normal guinea pig blood did not materially affect the "toxic endpoint" of antiseptics tested with these different antigen densities.

The following protocol illustrates the technic of the test and gives the results obtained on one of the common germicides:

A method for evaluating antiseptics for chemotherapeutic purposes should approach as nearly as possible the actual conditions of use in or on the human body. Accordingly, the "toxic endpoints" of 10 common antiseptics in guinea pig blood were compared with those in human blood from 8 individuals. The method used was that described in Table 1 except that fresh human blood was used in place of guinea pig blood.

TABLE 2

Toxicity of Antiseptics for Human and Guinea Pig Leucocytes

	Dilution Showing Complete Inhibition of Phagocytosis	
Germicide	*Human Leucocytes*	*Guinea Pig Leucocytes*
Iodine (Lugol's)	1:600 *	1:1,200 *
Iodine (Tincture)	1:600 *	1:1,200 *
Metaphen	1:1,500	1:2,900
Hexylresorcinol	1:5,000	1:5,500
Pot. Mer. Iodide	1:1,000	1:1,000
Mercuric Chloride	1:1,300	1:1,600
Metaphen (Tincture)	1:5,400	1:5,500
Phenol	1:400	1:500
Merthiolate	1:17,000	1:24,000
Mercurochrome	1:1,700	1:1,900

* Final concentration of 1_2

In Table 2 is given the average highest dilutions of 10 antiseptics which destroy the mechanism of the action of both guinea pig and human leucocytes. It will be noted that in all but one, greater concentrations of antiseptics were necessary to inhibit completely the phagocytic activity of the human cell. Potassium mercuric iodide was the only substance tested to which the guinea pig leucocytes showed a resistance equal to that of human cells. The greater resistance of the human cell is particularly noticeable with iodine (from tincture or Lugol's) and metaphen. A 1:600 dilution 1_2 and a 1:1,500 dilution of metaphen were necessary to inhibit completely phagocytosis of human cells, while a 1:1,200 dilution of 1_2 and a 1:2,900 dilution of metaphen brought about the same result with guinea pig leucocytes. In Figure 2 are photomicrographs showing the effect produced by certain dilutions of phenol and mercuric chloride on the phagocytosis of artificially opsonized staphylococci. To determine the toxicity of the antiseptics listed in Table 2 for bacteria the following method was developed:

METHOD FOR DETERMINING GERMICIDAL ACTION

Guinea pigs are bled aseptically from the heart (5 cc.) under ether anesthesia into 0.8 cc. citrate (20 per cent) in isotonic salt solution. Each 5 cc. of blood is then diluted up to 20 cc. with physiological salt solution (1:4). Final concentration of citrate is 0.78 per cent. The diluted blood is then infected with a 22–26 hour broth culture of *Staphylococcus aureus* (F.D.A. strain No. 209) so that each 0.2 cc. of blood is infected with 0.1 cc. of broth culture. The infected blood is distributed into Wassermann tubes 0.3 cc. per tube and brought up to 37° C. in the water bath. The chemical under test is diluted in sterile salt solution, brought up to 37° C. in the water bath and 0.2 cc. of each dilution added to the tubes containing infected blood. The final concentration of whole blood is 10 per cent. After a 30 minute interval a 4 mm. loopful is removed from each tube containing the infected blood antiseptic mixture and transferred to tubes

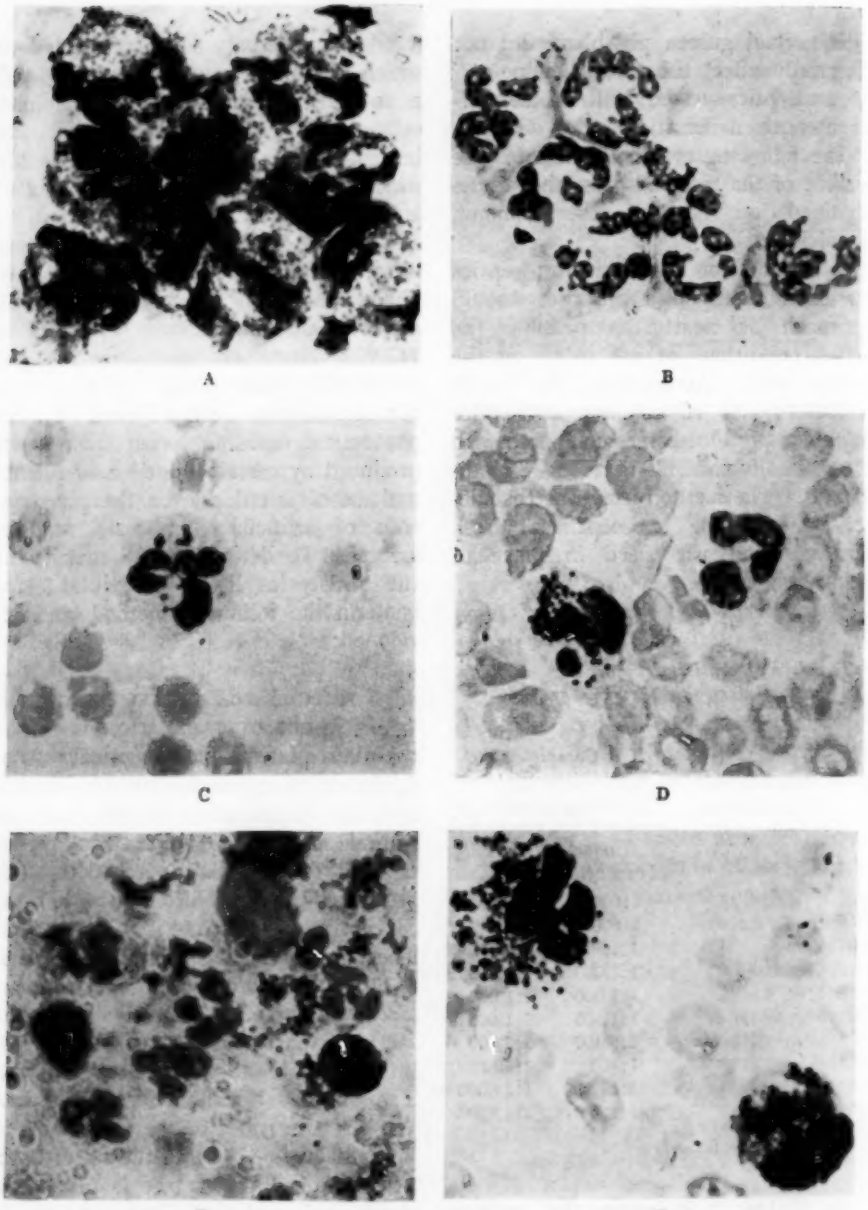

FIGURE 2

A Control: With no antiseptic present in system, leucocytes showed marked phagocytic activity of artificially opsonized staphylococci.

B Phenol in a 1:500 dilution (guinea pig blood) completely inhibits phagocytosis.

C Cell showing slight phagocytic activity. From system containing 1:600 dilution of phenol.

D A negative cell and one showing marked phagocytosis from system containing 1:700 dilution of phenol.

E Absence of phagocytosis in presence of a 1:1,500 dilution of mercuric chloride.

F Two cells showing marked phagocytic activity from system containing a *1:7,000 Mercuric Chloride*.

containing 10 cc. volumes of broth. The broth is that described by Ruehle and Brewer [7] for use in testing antiseptics and disinfectants. To reduce bacteriostatic effect, a second broth tube is then inoculated from the first with four 4 mm. loopfuls. The broth tubes are examined for growth at 24 and 48 hour intervals.

The toxicity for bacteria of 10 antiseptics has been tested by the above method. An average of 8 determinations made on each is given in Table 3. Following Salle's [1-2] method of computing the "toxicity index," *i.e.*, dividing the highest dilution of antiseptic toxic for tissue by the highest dilution capable of killing the test organism, the toxicity indices have been computed for each and are included in Table 3.

It will be noted that the toxicity indices of iodine from either Lugol's solution or from tincture were the same, 0.79 for human cells and 1.58 for guinea pig cells. This is due to the fact that the indices were computed on the basis of the actual concentration of iodine in these solutions. Since Lugol's solution contains 5 gm. of iodine per 100 cc. of water the actual dilution of Lugol's may be obtained by dividing the "toxic endpoints" obtained by 20. Correspondingly, since tincture of iodine contains 7 gm. per 100 cc. alcohol, the actual dilution of the tincture may be obtained by dividing the toxic endpoint by 14.3. The highest dilution of Lugol's solution which inhibits the phagocytic activity of guinea pig cells, therefore, is 1:60, while that of tincture of iodine is 1:84.

Even though the human were more resistant than the guinea pig leucocytes to the action of 9 of the 10 chemicals used, the relative efficiency of these compounds falls into the same order, regardless of the blood used in the test. In spite of the marked differences in technic used by Salle and his coworkers and the method reported herein, certain points of similarity in results were obtained. Salle and his coworkers demonstrated that iodine (Lugol's solution) was the best of 9 germicides tested, while phenol merthiolate and mercurochrome were found to be the poorest. By the technic reported in these studies similar results were obtained. While iodine (Lugol's solution

TABLE 3

Toxicity Indices of Ten Germicides with Human and Guinea Pig Blood

	Highest Dilution Causing Inhibition of Phagocytosis		*Highest Dilution Bactericidal for Staphylococci*	*Toxicity Index*	
	A	*B*	*C*	*Human*	*Guinea Pig*
Germicide	*Human*	*Guinea Pig*		*A/C*	*B/C*
Iodine (Lugol's)	1:600 *	1:1,200 *	1:760 *	0.79	1.58
Iodine (Tincture)	1:600 *	1:1,200 *	1:760 *	0.79	1.58
Metaphen	1:1,500	1:2,900	1:1,790	0.84	1.62
Hexylresorcinol	1:5,000	1:5,500	1:2,580	1.93	2.13
Pot. Mer. Iodide	1:1,000	1:1,000	1:460	2.17	2.17
Mercuric Chloride	1:1,300	1:1,600	1:540	2.40	2.96
Metaphen (Tincture)	1:5,400	1:5,500	1:1,715	3.14	3.20
Phenol	1:400	1:500	1:100	4.0	5.0
Merthiolate	1:17,000	1:24,000	1:2,980	5.70	8.05
Mercurochrome	1:1,700	1:1,900	1:58	29.31	32.75

* Concentration of I_2

or tincture) was 0.79 as toxic for the human cells as it was for staphylococci, phenol was 4 times, merthiolate 5.7 times, and mercurochrome 29.31 times more toxic for these cells than they were for staphylococci.

COMMENT

Normal blood has a definite bactericidal action which varies with the host and with the organism involved. The variation in bactericidal power due to different hosts depends on a number of factors including physical condition, previous history of disease, the opsonic power of the blood, the destructive action of the serum *per se*, and the number and efficiency of the leucocytes present. The variation in bactericidal power of the blood due to the type of organism differs widely with the species, the virulence, and number of organisms involved.

Since a part of the bactericidal power of the blood depends on phagocytosis, which in turn is dependent on the opsonic power of the blood serum, any decrease in opsonic power will result in a proportional decrease in the ability of the blood to destroy bacteria.

Fleming[3] in discussing the bactericidal power of blood points out that when a series of dilutions of phenol in salt solution are mixed with normal blood infected with staphylococci three definite zones of antiseptic activity can be demonstrated. In the control (no phenol) and in high dilutions of phenol (1:20,000) practically all of the staphylococci are destroyed, by the action of the blood itself; at a dilution of 1:640 phenol all the staphylococci survive (the bactericidal power of the blood is destroyed by this concentration of phenol), whereas at a dilution of 1:320 phenol all staphylococci are destroyed. Of these three zones of antiseptic action Fleming has called the 1st an *indifferent* zone, where no antiseptic action takes place on either leucocytes or bacteria, but the latter are destroyed by the bactericidal action of the blood; the 2nd an antileucocytic zone, where the antiseptic is toxic for the leucocytes but not for the bacteria; and the 3rd an antiseptic zone, where the antiseptic is toxic for both bacteria and leucocytes. The foregoing investigator has shown that all common antiseptics exhibit this phenomenon. It becomes obvious then that if an antiseptic destroys the function of the leucocyte much more readily than it kills bacteria there is little hope that it can act efficiently as a chemotherapeutic agent.

In the development of the proposed method an attempt has been made to approach as nearly as possible the conditions under which antiseptics are used. Whole fresh blood was chosen as a tissue since it is one of the germicidal agents of the body and as such should be assisted in its efforts to protect the host against invading organisms. By the use of artificially opsonized staphylococci, the degree of phagocytosis can be controlled within reasonable limits. Suspensions of treated staphylococci when standardized with the Feemster[6] modification of the Gates' apparatus maintain their uniformity for at least 1 month. The "corrected" Gates' reading is also valuable in the standardization of each newly prepared suspension. Considerable difficulty was encountered in attempts to standardize opsonins produced by animal injection while artificially opsonized staphylococci are quickly prepared and easily standardized. The test as described is simple to perform and does not require elaborate apparatus. The toxicity test may be carried out in the 37° C. water bath, although we have found the use of a rotating device which constantly mixes the blood, antiseptic, and artificially opsonized staphylococci gives somewhat more uniform results. Although the use of human blood in the

test rates the germicides in the same order as does guinea pig blood, the use of the latter appears at present to be the method of choice.

SUMMARY

A simple method is proposed for testing the toxicity of antiseptics using guinea pig or human blood as tissue.

The method is based on the complete inhibition by antiseptics of the phagocytosis of artificially opsonized staphylococci.

The toxicity and germicidal power of 10 germicides are reported. The "toxicity indices" were found to agree closely with those computed by Salle.

BIBLIOGRAPHY

1. Salle, A. J., McOmie, W. A., and Shechmeister, I. L. A New Method for the Evaluation of Germicidal Substance. *J. Bact.*, 34, 2:267, 1937.
2. Salle, A. J., McOmie, W. A., Shechmeister, I. L., and Foord, D. C. An Improved Method for the Evaluation of Germicidal Substances. *Proc. Soc. Exper. Biol. & Med.*, 37:694, 1938.
3. Bronfenbrenner, J., Hershey, A. D., and Doubly, J. A. Evaluation of Germicides by a Manometric Method. *Proc. Soc. Exper. Biol. & Med.*, 38, 2:210, 1938.
4. Fleming, Alexander. The Bactericidal Power of Human Blood and Some Methods of Altering It. *Proc. Roy. Soc. Med.*, XXI:25–33, 1928.
5. Fleming, Alexander. The Intravenous Use of Germicides. *Proc. Roy. Soc. Med.*, XXIV:46–58, 1931.
6. Feemster, R. F., Weterlow, L. H., and Cianciarulo, J. Standardization of Typhoid and Paratyphoid Vaccines. *A.J.P.H.*, 26, 12:1176, 1936.
7. Ruehle, G. L. A., and Brewer, C. M. United States Food and Drug Administration Methods of Testing Antiseptics and Disinfectants. *Circular 198*, Dec., 1931, U. S. Department of Agriculture, Washington, D. C.

The National Social Work Council

THE National Social Work Council is a conference body of national social work agencies associated for the purpose of exchanging information and studying common problems. The American Public Health Association is related to the Council by virtue of its membership in the National Health Council, which is one of the member agencies. Other health agencies directly identified with the National Social Work Council are the American National Red Cross, the American Social Hygiene Association, the National Organization for Public Health Nursing, the National Society for the Prevention of Blindness, and the National Tuberculosis Association.

The purpose of the Council as stated in its Constitution is to help national social work agencies, groups of such agencies and formal organizations of such agencies representing social interests, more readily to exchange information, to provide for regular conference between leaders and to provide through its committees for the investigation and study of problems common to all the agencies.

As to its methods, "the Council has no power to commit any national social work society to any course of action. Its influence and usefulness depend upon the wisdom of suggestions offered and the spirit in which they are offered. Education, it is believed, in the long run will carry further than any form of force. The delegates in a sense go to school to one another and are earnestly studying the most searching criticisms of the work of national social agencies. It is one of the few organizations not undertaking to do anything to anyone else."

Administration of Public Medical Service by Health Departments*

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TO persons not familiar with the varying points of view that obtain among members of the American Public Health Association it may seem odd that there should be any occasion for discussing the question at issue, namely: Who should administer tax-supported medical facilities and services? This is a simple question in governmental arrangement, and it is in no way concerned with current controversies relating to extension of public medical care or schemes of payment for professional services.

Substantial sums of money are now being made available through taxation for institutional care of the insane, the tuberculous, the physically handicapped, and for general medical service to the indigent and selected beneficiaries not in relief categories. Public officials, students of government, welfare workers, and practising physicians are in fairly substantial agreement to the effect that tax-supported functions that serve primarily health interests should be concentrated as far as possible in a single branch of government and be directed by a professional person of policy making rank. While not especially articulate on the point, the same groups perhaps would concede the health department to be the agency on whom administrative responsibility might appropriately rest. Public health workers, however, warily stand aside, fearful lest they be drafted for such duties. It is not uncommon for health officers, while admitting detached interest in medical affairs, to proclaim their lack of administrative competence. A few have gone so far as to appear before legislative bodies in opposition to the transfer of medical care services to health departments.

The matter of administrative responsibility for public medical service deserves most serious consideration, for on this decision may hinge the future welfare of the public health profession, and hence the preventive concept which it has espoused. Before a brief is presented supporting administration of medical services by health departments, some thought should be given to the inhibitions which deter health officers from accepting such responsibilities. Their attitude in large measure is closely related to the evolution of the public health program.

In former years, diseases accountable for most deaths gained wide prevalence either because of defects in scientific knowledge or disregard for personal and community hygiene of even the most elementary sort. Confronted with this state of affairs, it was incumbent on the health officer to give primary attention to such conditions as plague, typhus fever, yellow fever, malaria, typhoid

* Read at a General Session on Medical Care and the National Health Program of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 18, 1939.

fever, and the dysenteries; first, because these were major causes of death and, second, because their eradication was possible through rather simple procedures.

Striking conquests of disease during the past hundred years were readily attained by environmental control and mass education. There is a tendency to believe that maintenance of the ground gained is sufficient in the way of current accomplishment even though the maintenance of this static condition represents no particular effort. In this country at least, an esthetic sense and a desire for those conveniences commonly associated with sanitary devices serve automatically to insure continuance of measures necessary to hold in check most of the diseases previously mentioned. Furthermore, improvement in living conditions that usually goes with increased purchasing power among wage earners has brought about a lessening of the more serious nutritional disorders that arise out of privation.

It is the consensus of competent professional men today that the greatest opportunity for further improvement of the public health lies in the category of activity that is commonly classed as service to the individual. Of their own accord, the more progressive health departments for some time have been giving recognition to changing conditions as evidenced by their programs in immunization, diagnostic services for school children, care of the tuberculous, and hospitalization of persons with communicable diseases. More recently, largely through federal stimulation, attention has been focused on venereal diseases and the health problems associated with maternity and childhood. By and large, however, there has been no wide acceptance in public health circles of general medical care as a field for development. True, a few leaders of public health thought recognize the problem in an academic sort of way, but practical administrators as a group are disposed to regard the service as a commodity which the individual might purchase in proportion to his wishes and resources.

It is conceded even by those who are most reactionary that society has an obligation to meet the emergent needs of its dependent members. Health officers fear that a combination of public health services with medical care is certain to work to the detriment of the former. This of course is only speculation. There is no evidence to show that public health services of the traditional type fare better in departments without responsibility for medical service than in those with such encumbrances. Furthermore, the rapid growth of hospitals and medical services under welfare departments and separate commissions attests to the fact that action will be taken in these areas of social service irrespective of sponsorship. This development has taken place in response to a popular demand and often without adequate professional guidance, largely because the health authorities refuse the function of management.

As matters now stand it is the appropriating authorities that decide how much shall be allotted respectively to traditional public health services and how much shall be expended for medical care. According to all principles of organization the health department would be in better position to determine this apportionment if it had charge of the several functions of government designed to serve the health interest in its broader sense.

Another and perhaps the most compelling cause for hesitancy on the part of health officers to accept responsibility in the field of medical care is fear of being stigmatized by association with so-called socialized medicine. The contention of health officers that public health service is for all the people carries with it the implication that medical

service, if operated by health departments, would at once be made free to every citizen. Such thinking obviously is not realistic. It is the low-income and dependent classes of the population that now form the clientele of health department clinics. Essentially the same group now constitutes the beneficiaries of public medical facilities.

One type or another of public health or medical provision may predominate according as the facilities are developed in particular communities. The notion that indigency must be the qualification necessary for participation in benefits where physicians are employed still prevails and there is little likelihood of either type of service being expanded to include self-sustaining groups of the population without a direct mandate from the people. In that event the beneficiaries will be defined through legal enactment rather than through any discretionary authority that may be exercised at the admitting office, thus removing eligibility from the field of controversy.

Even if one granted that all of the foregoing disadvantages might accrue to health departments from having accepted responsibility for the administration of medical care, the inherent opportunities for enlarged service to the community far outweigh any other consideration. In this way only can a health officer exploit all the possibilities for health promotion. It is understood that prevention of illness would be the first concern in a health program regardless of its content. As a second objective, those unfortunate individuals on whom sickness falls should be afforded every opportunity for recovery and restoration to former health. These purposes certainly are more easily accomplished when the health officer has at his command technics and facilities for performing service suited to the individual's requirements than under the present dispersion of authority.

As stated at the outset, this paper is not concerned with the wider distribution of good medical care, a subject on which the public is becoming especially articulate. Rather an attempt is being made to present the opportunities for bringing to recognized beneficiaries better service from existing facilities through operation by health departments. Good medical service has a preventive content of another type from that exhibited by immunization, for example. This perhaps is expressed best in a negative way. A poorly handled fracture may cause a worker to lose employment in an occupation for which he is especially prepared. An eye injury, unless treated promptly and skillfully, may cause loss of vision and reliance on pension for the blind as a source of income. Neglect of a circulatory disturbance or failure to recognize the condition in its incipiency often results in early disability, unemployment, and finally dependency.

Cancer is not a disease confined to senility as often supposed. A large percentage of deaths occur at a time of life when social and economic obligations of the individual are at a maximum. Especially is this statement true of cancer among women. Children thus deprived of their mothers often become dependent and therefore a direct burden on society. No longer may the health officers find refuge in the old dodge: "Our function is to prevent disease, not to cure it." As stated, disease prevention, even to the point of eradication, should always remain the goal of public health enterprise, but prevention today has many connotations. Now it is expected that disability both temporary and permanent should be lessened by any device which society can command.

Some of the apologists for limiting activities of health departments to programs of traditional content make the point that a complete job is not being done at the present time even within

this narrow range. As opposed to this viewpoint, evidence could easily be adduced to show that concentration of forces against these limited objectives is attained by neglecting other opportunities for greater achievement. The 10 major causes [1] of death in the order of occurrence are as follows:

Heart diseases
Cancer, all forms
Cerebral hemorrhage, arteriosclerosis, and high blood pressure
Pneumonia, all forms
Accidents
Nephritis, acute and chronic
Tuberculosis, all forms
Malformations and diseases of early infancy
Influenza
Diabetes mellitus

Only tuberculosis and the disorders associated with early infancy are recognized in health department programs of orthodox type. The causes of disability as measured by days absent from work or usual occupation are quite different from the causes of mortality. Again, if one should arbitrarily select 10 major causes [2] for inspection, the array in descending order of importance would be

Colds and bronchitis
Influenza and grippe
Accidents and injuries
Tonsillitis and laryngitis
Indigestion and other stomach disorders
Rheumatic disease
Confinement and miscarriages
Diseases of generative organs (nonvenereal)
Ear and mastoid diseases
Diarrhea and enteritis

For many years health department programs skirted this group except diarrhea and enteritis. Largely through stimulation by the U. S. Children's Bureau, the hitherto neglected field of maternity seems destined to receive more and more attention. One must readily concede that many facts remain to be established before our knowledge can be considered satisfactory in respect to the causes of mortality and morbidity previously enumerated. On the other hand, measures for combating cancer, pneumonia, heart disease, and accidents, for example, are perhaps more effective than those now used against whooping cough, measles, poliomyelitis, and several other conditions on which a very large part of public health effort is spent.

The nature of ill health and its underlying causes might be pursued, but this is not the occasion for a lengthy discussion of the consequences of neglected illness or the humanitarian considerations which impel some provision for the relief of human suffering. Only a few generalizations can be made concerning the extent of tax-supported facilities and services now available, the opportunities for promoting public health through a better arrangement of available resources, and the suitability of health agencies for administering organized programs that serve the public health.

If health departments are to enlarge their interests in medical administration, the obvious first step is to assume greater participation in the management of functions now accepted as within the scope of public responsibility. Institutional care of the mentally afflicted is for all practical purposes a monopoly of government. Among nearly 600,000 beds of mental institutions in the Continental United States more than 500,000 are operated by federal, state, and local governments.[3] While field services in the interest of mental hygiene have not as yet attained significant proportions, mental institutions seem destined to be the centers from which such programs should develop. Health departments have not been identified to any appreciable extent with either the administration of mental institutions or the mental hygiene program. It seems doubtful if health departments can attain any stature in mental hygiene without first taking charge of the mental institutions.

While tuberculosis control was initiated by voluntary organizations, health departments at an early date recognized some responsibility in respect to case finding and field control measures. In contrast, however, a high proportion of sanatorium beds are not under direct control of health departments despite the fact that 80 per cent of such beds are in tax-supported institutions. As a result of this divided responsibility, it is difficult to bring about a proper integration of institutional and field services.

Relatively few people appreciate the fact that a very large medical service for self-supporting people has grown up through workmen's compensation. The insurance principle is used for spreading wage loss and the costs of medical care. While the benefits are geared for the most part to accidents arising out of employment the aggregate amount of care represents a money value of significant proportions. This social development occurred without intimate medical guidance and entirely beyond the ken of public health authorities. It requires no great amount of insight to appreciate the possibilities for promoting the health of workers through a closer association between health departments and compensation commissions than now exists.

The figures compiled annually by the American Medical Association show a steady and substantial increase in the number of general hospital beds under the control of state and local governments. These units of government operate nearly one-fourth of the beds in general hospitals. In addition to maintaining hospitals, governments contribute $32,000,000, or about 9.5 per cent of the income reported by voluntary hospitals.[4] While the number of out-patient departments attached to governmental hospitals is not so great as the number operating under voluntary auspices, proportionately more of the public hospitals operate such facilities. Like the sponsoring hospitals, governmentally operated out-patient departments tend to be larger than their voluntary counterparts. A study conducted by the U. S. Public Health Service in 1936 showed that 9,500,000, or 44 per cent, of the visits were made that year to out-patient departments of tax-supported general hospitals, as contrasted with 13,500,000, or 56 per cent, of the visits made to those under voluntary control.[5]

The volume of tax-supported medical service supplied directly by physicians in their offices and in the homes is difficult to express since the service is administered under a variety of auspices. Furthermore there is no regular provision for reporting to a central agency. The estimated public expenditure of $25,000,000 per annum for care of patients outside of hospitals[6] shows very clearly that such service is of sufficient magnitude to arrest the attention of groups who should be interested in seeing that public services operate under competent professional direction. Despite the fact that medical care of needy persons has been recognized as a function of local governments since colonial days, the service as a rule is inadequate and poorly administered. The deplorable state of the home and office component may be attributed in large measure to the fact that tax-supported medical service usually operates without professional direction by a responsible public official. Meager though the sums appropriated by individual localities for such care may be, yet in the aggregate the expenditures for the nation as a whole represent a substantial amount. It is quite likely that appropriating authorities would be disposed toward greater liberality if good administration could be assured. Practising physicians no doubt would welcome impartial management by full-time health officers.

While the inadequacy of public pro-

visions for medical service of all types has become the theme for much discussion within recent years, strangely it is the magnitude of the expenditure for such service that causes health officers to avoid operating control. The estimated amount $130,000,000, used for the support of old-line public health service is dwarfed by $400,000,000 of tax money that now goes for the support of medical service including the care of persons in institutions.[6]

Arguments for and against participation by health departments in administration of medical care services could be pursued and perhaps with profit to the end that our views on the subject might be clarified. In a forum such as this, interest would perhaps hinge on the convenience of the health officer or the effect which the inclusion of medical care would have on his present program. From the standpoint of public administration such attitudes do not merit consideration. Those responsible for the arrangement of functions within the structure of government are concerned only with placement of responsibility where it can be discharged most satisfactorily to the interests of the taxpayer and of the beneficiary.

In closing, let us try to visualize a very practical situation that confronts public officials of a local political unit containing for example 50,000 inhabitants. The area maintains a small health department headed by a full-time medical officer. As assistants, there are employed another physician or two; a chief of sanitation, who may be an engineer, and several inspectors; a corps of public health nurses; one or more laboratory technicians; and the usual clerical force. The same community may operate a small tax-supported hospital; or, more than likely, care is purchased at local hospitals under voluntary control. Both the county physician system and a fee-for-service scheme have been tried for rendering home and office care to the indigent sick but neither plan has proved satisfactory. Altogether the area under consideration spends $50,000 of tax money or possibly more on public medical service of one type or another, in addition to the cost of maintaining clinics operated by the health department and persons in state institutions. Part of this fund is administered by the welfare department, another fraction directly by the county commissioner or city council, a substantial sum by a hospital board, and perhaps the county medical society has a mechanism for dividing among its members the amount paid for professional services. Neither the sponsors nor the consumers of service are exactly satisfied with the system or what might better be termed lack of system. Public officials, welfare authorities, and practitioners of the healing arts see the needs of sick people that remain unsatisfied and the wish to do more.

For an enlarged program they might find support among taxpayers if assurance could be given that the service and its administration would be made reasonably satisfactory. Under no circumstance, however, would the volume of such service be sufficient to justify the maintenance of a medical organization exclusively for its administration. In this area, please remember, there is a health department of average size and reasonable competence. It is the only publicly supported group of workers with medical and administrative experience; its leadership would be acceptable to public officials, welfare workers, the medical profession, and to the general public.

Public health workers in attendance at this convention, and especially those residing in places away from large urban centers, will recognize immediately that the situation described is typical of many areas even where an honest effort is being made to supply some reasonable measure of care. In those areas what

should the local health department do about administration of accepted tax-supported medical care? Does this Association have any advice to offer? It should be emphasized again that the question relates to "administration" of the medical care program and not actual care of patients by the executive health officer. Attempting to place responsibility on the doorstep of the county medical society is a subterfuge not deserving to be classed as artful sidestepping. It puts the onus for the present disorganized state of public medical service on a loosely knit society formed to serve the scientific and professional interests of its members. The acceptance of this challenge by the society would be equivalent to management of a public service by a guild with a vested interest. This of course would be contrary to recognized principles of public administration and is not likely to achieve any wide acceptance in our democratic society.

If the American Public Health Association and other professional groups have no further suggestions to offer, decision must be referred back to the people and their political leaders. We may rest assured that rather simple and direct steps will be taken, and it is entirely possible that the particular interests represented by the membership of this Association may become a subordinate consideration in a broad social program that features other issues.

REFERENCES

1. Bureau of the Census, Department of Commerce. *Vital Statistics—Special Reports*, 6, 51 (Apr. 29), 1939.

2. Collins, Selwyn D. The Sickness Survey: Types, History, and Some Results. To be published in revised edition of *Nelson's Loose-Leaf Preventive Medicine*.

3. Hospital Number, *J.A.M.A.*, 112, 10 (Mar. 11), 1939.

4. Pennell, Elliott H., Mountin, Joseph W., Pearson, Kay. Business Census of Hospitals, 1935, General Report. *Supp. No. 154, Pub. Health Rep.*, U. S. Public Health Service.

5. Plumley, Margaret Lovelle. General Out-Patient Departments the Important Element in Organized Out-Patient Care. *Hospitals*, 11, 9 (Sept.), 1937.

6. *Proceedings of the National Health Conference*, July 18, 19, 20, 1938, Washington, D. C. U. S. Government Printing Office.

Quality of Medical Care Under a National Health Act*

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SENATE Bill S 1620, known as the Wagner Health Bill, provides "for the general welfare by enabling the several states to make more adequate provision for public health, prevention and control of disease, maternal and child health services, construction and maintenance of needed hospitals and health centers, care of the sick, disability insurance, and training of personnel. . . ." These objectives are noncontroversial. Representative consumer and professional organizations have expressed agreement with them. The Senate subcommittee appointed to consider the bill has reported that it "is convinced that Federal legislation along the general lines followed by S 1620, based upon Federal-State coöperative programs, is necessary to strengthen the health services of the Nation. . . ." It seems to be agreed that the planning and operation of health services are to be left to the local communities and states. The rôle of the federal government is to provide the states with financial and technical aid.

Physicians throughout the country, who have considered the Wagner Bill carefully and soberly (and there are some such) are apprehensive. They know that the appropriation and expenditure of federal moneys may of itself accomplish no useful purpose and may even do harm. They feel that the Wagner Bill places relatively too much emphasis on making federal moneys available to the states and too little emphasis on safeguarding high standards and economical service. They feel that the major concern of a federal health bill, which correctly leaves the operation of services to the states, should be the establishment of machinery and principles that will assure economy and efficiency in the appropriation and expenditure of federal funds. They know that good medical care today is so costly that the public cannot afford it, unless the greatest economy and efficiency is practised in its provision.

The American Medical Association, the Committee of Physicians for the improvement of medical care, and other professional groups appearing before the Senate sub-committee have proposed a unification of federal health services and authority under the bill. They are aware that certain compromises to conform with existing federal health machinery are advisable. For example, provision should be made for continuing and expanding federal health services of proved merit. But ultimtaely all such activities should be coördinated and merged into a general program. Simi-

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larly, within a reasonable length of time the health services of each state should be consolidated into a single state health agency. These compromises as regards time of unification can be made without jeopardizing the main objectives of the bill. But, to the vast majority of the medical profession, the divided control specified in the bill, as it now stands, is not compatible with economy and efficiency.

The unification of services and authority risks, of course, placing all the eggs in one basket. It is essential, therefore, that the central federal authority be properly constituted. Representatives of governmental agencies, as well as private groups, have recommended a single federal health council including both professional and public representatives. The Committee of Physicians feels that a federal health council should be more than advisory. It should be composed not of representatives but of leaders and experts. Since the Council's main purpose will be improving medical care and the standards of the institutions and individuals participating in this care, its problems will be largely professional. It should, therefore, be largely composed of physicians. It should be endowed with prestige and effective approving authority.

The Committee of Physicians has proposed the establishment of a General Health Council which shall have the power to define and supervise standards of medical care, education, and research for which grants-in-aid are appropriated. No grants shall be made without the Council's approval. With such veto authority, it can strengthen the position of the Chief Executive of the central administration agency—who, it is recommended, will be the Surgeon General of the U. S. Public Health Service. Remuneration of the Council's members must be generous enough to attract persons of the highest quality. In addition, scientific and technical sub-committees should be constituted under the authority of the Council to aid in its task of defining and supervising standards. In order to strengthen the position of the General Health Council in the interests of economy and better medical care, the Committee of Physicians has proposed that certain basic principles be incorporated in the bill. Among these are:

1. Hospitals or health centers must not be constructed to meet a temporary local condition in a manner or place that will not serve the ultimate purpose of a comprehensive program. They should not be constructed where existing public or private facilities are available or can be made available at reasonable cost.

2. Hospitals must be staffed by qualified physicians and surgeons and no person will be allowed to assume professional obligations for which he has not demonstrated competence. Every effort should be made to permit qualified physicians to participate in the activities of approved hospitals. Physicians should not be denied these facilities which are essential to good practice and the continued education of physicians.

3. An integrated program of health service and medical care should include: adequate public health and welfare services under competent control; the services of an individual physician, including office and home care; coördinated services of specialists and consultants; availability of modern diagnostic and therapeutic facilities, including hospitalization when needed.

4. The Federal Health Authority shall have the power to pass upon the adequacy of medical services available to beneficiaries under federally supported disability benefits.

And finally the Committee of Physicians feels that it is imperative that provisions be made in a special title of the bill for general medical education and research. Grants for these activities should be made by the General Health Council upon direct application from universities, other educational or research institutions and individual investigators.

Probably there are other means of strengthening the bill against the forces that will militate against it. If so, they

should be utilized. For, even with all these provisions written into the bill, two factors may prevent the attainment of the desired purposes. First, tradition, habit, sentiment, inertia, and vested interests will favor the application of our present individualistic fee-for-service practice to tax supported medicine. If this be done, federal moneys will be dissipated by paying the costs of an unorganized and uneconomical system of medical practice—a system in which physicians may do little or nothing to institute real economies in medical services; and in which overhead expenses proscribe a net income that is insufficient to enable most physicians adequately to keep abreast of the advances in their profession. Under such a system it is almost inevitable that the demand for appropriations will take precedence over concern for efficient organization. Extravagant appropriations may be made and spent, but the large government and charity hospitals of which we are so proud and upon which we are so dependent for introducing advances into medical practice will still be inefficiently organized and unable to afford the equipment and personnel which increase the efficiency of our private financially successful clinics.

Available experience shows that current individualistic medical practice and tax supported medicine are incompatible. It is one thing to have a patient pay a doctor for each visit or service rendered and a far different thing to have a third party make the payment. Where the patient pays or is under obligation, there is an automatic check on unnecessary and extravagant medicine. Where a third party pays, there is the opportunity of malingering or faking on the part of patients and of prolonging or exaggerating treatment on the part of physicians. The incompatibility of individualistic fee-for-service practice and tax supported medicine has long been recognized by the American Medical Association. Its desire to defend the former explains its past opposition to the latter. And yet state medical societies are ignoring this incompatibility. They are setting up various voluntary insurance schemes without any adequate coördinating or supervising administrative unit. Under these schemes the insurance premiums or subscription rates are to pay the costs of individualistic fee-for-service medicine. If the subscription rates are to be kept at a price the public can afford, fees will have to be slashed or services curtailed. In either case the quality of medical care will deteriorate. If the states should elect to provide tax supported medicine by such a system, the General Health Council or any other authority under a national health act would either have to permit an uneconomical use of public funds or have to refuse appropriations.

The second factor, that may prevent attaining better medical care under a national health bill, pertains to standards of cost. In the past the rich have paid the costs of medical care. They have not until recently been seriously concerned with economy. Under tax supported and voluntary insurance medicine, instead of the rich paying for the care of the poor, the healthy will support the medical care of the sick. Thus the base upon which the financial burden rests will be broadened. It will include people who cannot afford and will not bear the costs of uneconomical service. The demand for economical service will increase. The danger is that this demand may lower the price below that at which a decent quality of service can be provided.

The most practical way of meeting these two adverse factors is to provide medical services suited to the needs of tax supported medicine. Then standards of quality and costs applicable to tax supported medicine will be available. Today they are lacking. The crying

need today before legislation is enacted is an increase in the number of voluntary prepayment or insurance medical service groups properly organized in the interests of economy and efficiency and for the maintenance of a high quality of medical service. An increase in such services is, of course, important in so far as it would somewhat reduce the large number of persons of moderate income who cannot pay the current high costs of medical care and must under the present system be provided for by compulsory State plans. But the real importance in the establishment of such medical services is that they provide the experience and standards of cost and quality essential to sound State plans. It is to be regretted that the old bugbear of the illegality of the corporate practice of medicine can still be used by a highly organized group within the medical profession to impede the establishment of well organized medical services, for incorporation facilities the proper distribution of liability and the adequate financing of such organizations. Inadequate finances render difficult the centralization of offices, nurses, technicians, expensive laboratory equipment, and facilities essential to economy. They prevent operation on a scale large enough to assure that the subscribers represent a cross-section of society and thus a fair risk.

If only our large well equipped hospitals and their staffs of visiting and courtesy physicians would voluntarily organize to extend their services so as to supply complete medical care in the home, in the doctor's office and in the hospital! Given the good will of the physicians and the scrapping of the fee-for-service system of payment, executive committees of these units could meet the problems of an expanding hospital and home service, of an enlarging staff, of qualifications of specialists and consultants, and of methods of remunerating physicians by the central administrative offices. Such groups, well administered, would possess potentialities of supplying a high quality of medical care more economically and efficiently than can be envisaged as deriving from any other existing medical resources. The experience and the standards of quality and costs provided by such units would be of inestimable value in solving the problems of tax supported medicine.

In conclusion, let me summarize the two points I wish to emphasize. First, if a national health bill is to be written at all, it should be one that has some chance of attaining the desired ends, not one in which compromise at the inception has defeated them. Second, the lack of coördination, efficiency, and economy that is inherent in our present individualistic medical practice must not be carried into State tax supported medicine. To argue that it should, because the medicine we have today is better than that which we have had is irrelevant. We are concerned with the quality and cost of the medicine we shall have, when legislative enactments have given us tax supported medicine. The questions before us are: Must a system of providing medical care be used, which will make that care more costly and more inefficient than it is today? Or, faced with the reality that tax supported medicine is at hand, shall we insist that it be provided economically and efficiently? If we do, health and solvency may be had. One thing is certain—the one cannot be had without the other.

Practical Application of Industrial Exhaust Ventilation for the Control of Occupational Exposures*

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THE development of any type of engineering control for the protection of industrial health must be based on: (1) A specific job analysis of the operation or operations performed; (2) A study of operator technic; (3) Engineering and scientific data for developing control of the hazard involved.

To the layman there is no glamour to a drawing or an exhaust system, but to control engineers who, with the physician and chemist, form a tripod of attack for the protection of industrial health in the plants of this country, a properly designed and satisfactorily functioning exhaust system signifies something that is alive for it represents positive protection for the health of industrial workers.

FUMES AND ODORS

Certain industrial operations are productive of annoying and irritating fumes and odors. Among these may be mentioned acrolein which results from the decomposition of oil or materials containing oils or fats.

In the manufacture of strip copper, the billet, having been previously brought to proper rolling temperature in a preheating furnace, is carried to the roll table in front of the reducing rolls by means of an electric hoist suspended from an overhead monorail. It is then passed back and forth through the rolls to be reduced to the required gauge. The insides of the rolls are water-cooled. The surface of the rolls is swabbed with a special grease mixture to prevent the formation of scale or oxidation of the surface of the copper slab. In view of the fact that two operators are located directly in front of the roll table on the entering side or front of the rolls, one operator being located on the rear or leaving side, while a gauge operator on the side of the rolls regulates the roll displacement as the slab passes back and forth through the rolls, it was thought that the control of the dissemination of steam, flame, and large volumes of acrolein vapors could not be satisfactorily accomplished. This operation has been performed for many years without any control. As a result, the interior of the building structure directly above the rolls is covered with a hard deposit of carbonaceous material, which, aside

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from being unsightly, also presented a fire hazard. On days when the humidity was high or when doors and windows were closed during the winter, the heavy vapors dispersed throughout the entire shop area to the discomfort of all workers.

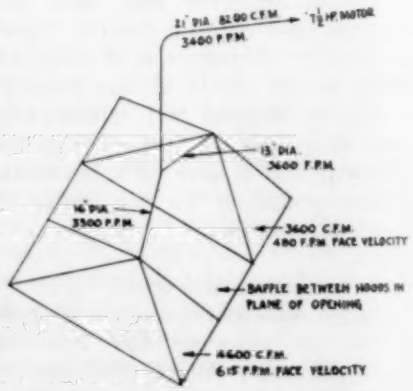
About a year ago an attempt was made to catch and exhaust these vapors. A sheet metal hood 7′ x 7′ was located directly over the rolls and about 12′ above the floor line, so as to clear all of the monorail structure. A 12″ dia. exhaust duct was connected to this hood and approximately 3,000–3,500 c.f.m. were exhausted. The original motor on the job was 7½ H.P. As soon as the system was operated it was found to be inadequate. The motor was changed to a 10 H.P. and then to a 20 H.P. with the hope that more air would be exhausted. Not realizing the relationship between fan performance and system characteristic, a point was soon reached where excess power was consumed without any additional effective control at the rolls.

The present installation is the result of a proper analysis of the various factors involved. The location of the preheating furnace relative to the rolls precluded any different method of billet handlings than that which is at present being used, i.e., the overhead monorail and chain-hoist is one controlling factor in the location of any exhaust hoods or ducts. To catch the steam, flame, and acrolein vapors effectively, any hoods must, of necessity, be close to the rolls. They could not extend very far forward or to the rear of the rolls due to the presence of the three operators. The front hood location was practically set as it could not come forward of the point where the hoist-chain was located when the billet was lowered to the roll slab. Again, hoods could not be dropped below the

FIGURE 1

Hot billet being sent through the roll—no vapor or steam in front of the hood

Arrangement schematically presented



heads of the operators in front or rear of the rolls nor could panels be dropped on the sides of the hoods, for they would interfere with the vision of the gauge operator. Since most of the

irritating acrolein vapors from the rolls were generated in front as soon as the hot billet came in contact with the greased cool roll, more air was exhausted from the front hood. The arrangement is schematically presented in Figure 1 together with all of the air engineering data for the entire system. The result of the installation is shown in the picture taken just when a hot billet was being sent through the rolls. Not a whisp of vapor or steam rolls past the front edge of the hood.

The elimination of this exposure is based entirely on engineering control. The system calls for large air volumes and high face velocities at the lower face of the exhaust hoods, 615 f.p.m. and 450 f.p.m., respectively.

LEAD

An unusual lead exposure presented itself in the manufacture of an electrical specialty.

A call was received from the plant owner that some of his female employees were becoming ill. One of the girls had complained of severe abdominal pains.

The section of the plant where the trouble developed was a partitioned portion 26′ long x 13′ wide and 11′ high. One long and one short side contained movable steel sash. Three female and two male operators performed certain operations incident to the manufacture of these specialties. A survey of the work area and a cursory examination of the operators indicated a possible lead exposure, though the owner stated that as far as he knew, no lead of any kind was present in any of the materials used in the manufacture of his products. Samples of all the materials used in the process were obtained and analyzed by our chemists. One of the materials contained between 50 and 60 per cent lead, presumably as a borosilicate. The owner communicated with the manufacturer of this material and was informed that " it did contain a considerable amount of lead."

As a result of the first lead study which showed lead concentrations ranging from 7 to 15 mg./10 M^3 (7–15 mg. per 10 cu.m. of air), the following recommendations were transmitted with the report and thoroughly discussed with the management.

1. Bottles of drinking water and milk should be removed from the work area. When workers require water they should be supplied with paper cups or a bubbler fountain should be provided and located outside the work area.

2. Candy, chewing-gum, or food of any kind should not be eaten in the work area.

3. An inclined tumbling barrel wherein the ingredients were mixed should be removed from the work area and placed in an isolated enclosure, said enclosure to be provided with a propeller fan for general ventilation.

4. The operator working in the area wherein the tumbling barrel is located, should be provided with and use a respirator approved for protection against the inhalation of lead dust.

5. Specific recommendations were outlined covering changed technic in the mixing, dumping, and storage of the mixed materials.

6. Female operator technic of flipping flannel cloths against legs of the supporting table to remove excess material dropped from the specialties during their progress in the work area should be immediately stopped. This operation alone was found to contribute considerable dust and lead to the general work area. These cloths were found necessary to protect the chrome-plated surface of the specialties from becoming scratched.

7. No cleaning of any kind should be performed during working hours—especially dry brushing of the work tables—but preferably after working hours and by an operator protected with an approved lead dust respirator. A small portable vacuum cleaner would be a desirable piece of equipment for this purpose.

8. The solid metal top of the 14′ long x 18″ wide work table should be provided with screen or grille sections at the operator stations, each grille section to be located over a hopper and each hopper to be connected to a main exhaust system to discharge outdoors to a dust collector.

9. Previous to any ventilation installation, and after the tumbling barrel has been removed, ceiling, walls, floor, windows, and

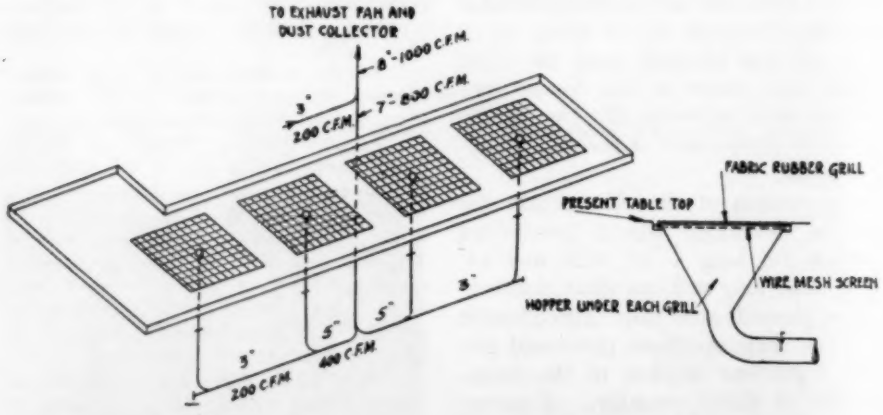
work tables should be thoroughly flushed with water to remove all present dust deposits.

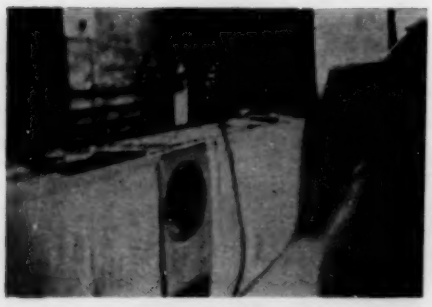
Recommendations 1, 2, 3, 4, 5, 7, and 9 were immediately complied with. Suggestion 8 is schematically illustrated in the upper portion of Figure 2. At each working position a rubber covered grille about 18″ x 10″ is set into depressions in the working face of the table as shown in the upper right-hand section of the sketch. Each grille is to handle about 200 c.f.m. at a net face velocity through the openings of 100 f.p.m., and a fan unit is to provide 800–1,000 c.f.m. exhaust capacity. Duct velocities averaged about 3,000 f.p.m.

The first attempt by the management is shown at "A" and "B." The solid top of the table was replaced by a heavy wire mesh set between the angle iron edges of the table. On top of this mesh were placed small fabric-rubber mats. Canvas curtains were placed along the front of the table down to the floor. At each work station, though not shown in either of these illustrations, inclined solid metal trays extended from the under side of the mesh grille to tote-boxes on the floor. These were to catch any material dropped through the grille top from the specialties as they progressed from operation to operation along the top of the table. About half way along the length of the table a

FIGURE 2

Schematic arrangement for down draft ventilated table—"A" and "B," front and rear views of attempted control





"A"

"B"

metal panel was located, containing a 12″ dia. copper reflector, salvaged from a reflector-type bathroom heater. The inside of the reflector was connected to a 6″ dia. inlet of a small direct-connected fan unit operated by a ⅛ H.P., 1,740 r.p.m. motor. The 3″ dia. outlet of the fan was located inside a 6″ dia. stove-pipe, shown at "B." This pipe extended through a hole in the building wall to the outside. Neither trap nor collector was connected to the end of this pipe. The idea of the reflector and fan installation was for the operators to flip their flannel cloths against the grille in front of the reflector so that all the dust would be immediately exhausted outdoors. When not so used, the fan was supposed to aid materially in purging the general work area of lead dust.

From an engineering standpoint, the installation was entirely psychological and typical of many industrial exhaust installations operating today.

After these changes, a second dust study was made, sampling points being the same as in the first study. Atmospheric lead concentrations ranged from 4 to 5.5 mg./10 M^3. This was a considerable reduction from the 7 to 15 mg. range of the first study. The reduction in concentration is to be attributed to the removal of the inclined tumbling barrel from the work area, some improved operator technic, and especially the purchase of a portable vacuum cleaner, the effective results of which were immediately manifested by the improved housekeeping and reduction of deposited dust throughout the work area.

Some time after the second study was completed, arrangements were made with the private physician employed by the plant to obtain blood smears of all operators with a view of making basophilic aggregation tests to determine the extent of lead absorption. Due to press of our own laboratory work it is indeed unfortunate that the lead smears were not obtained when the trouble started a few months previously. Again, smears were not obtained at regular intervals so that curves cannot be plotted to show the reduction of the basophilic from time to time. Original samples ranged from 1 to 2.5 per cent and then dropped to 1 per cent and 0.5 per cent. McCord and his associates state:

> In the adult healthy human, the percentage of basophilic aggregations is usually below 1.0 per cent, frequently as high as 1.5 per cent but rarely as high as 2.0 per cent. In the use of this testing procedure in connection with the diagnosis of lead poisoning or lead absorption, no consideration is usually attached to findings until the number of basophilic aggregations rises above 1.5 per cent or 2.0 per cent.

The results of the second study were transmitted to the management and interpreted to the extent that a serious lead hazard still existed in this work area. The down-draft ventilated grilled-top hoppers were then installed. Slide type blast gates were installed at each hopper to regulate the air-flow. A cyclone dust arrestor was also located outside the building wall between two wings of the plant buildings. The only criticism that the management had of the ventilated hoppers was that they were trapping and exhausting to the dust arrestor about 16 per cent of the material daily prepared to be used in the electrical specialties. This seemed too great a loss, so modifications to the system were immediately made. Dust traps were made for the bottom of each hopper. These traps, 11″ dia. x 19″ high, caught practically all of the heavy material while only the fine dust, not necessary for the specialties, was exhausted to the arrestor outdoors.

No further sickness or complaints of any kind have been received by the management from the workers in this section since the new ventilation system has been in operation. Up to date,

bureau activities have prevented a final check study but this will be made in the near future.

The elimination of this exposure is based on chemical and engineering control. Closer medical control through early and continued basophilic aggregation tests would have been of material aid in the solution of this serious exposure.

SILICA

As a result of a general survey of an industry in the state, there was uncovered a very serious silica exposure, one which has been prevalent in the industry for the past 25 years.

In the manufacture of tubing, many of the sizes are produced from solid billets by means of extrusion machines. Some sizes, depending on wall thickness, require that short sections of the tube be cast and then extruded to finished dimensions. To cast these tubes, a sand core is required, and it is during one of the operations in the series pertaining to the core preparation that the silica exposure is serious.

Various grades of beach and building sand are intimately mixed in a standard foundry Simpson mixer until a "mud" of proper consistency has been developed.

A hollow, perforated, steel core mandrel is next covered with asbestos paper. This is done on a bench containing two sets of small rolls for supporting the ends of the mandrel. Depending on the particular diameter core desired, an adjustable steel knife edge is set at the proper distance from the center of the steel mandrel. Pails of the prepared "mud" are dumped on the table in back of the mandrel. Some plants use

FIGURE 3

Three-quarter side view showing screen top of hopper "A" and sand ridge "B"

Hand sanding operation to remove ridge and to bring cores to proper diameter

Front view of hopper arrangement for core sanding operation for removal of ridge "B"—flexible exhaust tube "A" connecting to rear of hopper

a regulated electric drive, others use a hand-operated crank to turn the steel mandrel while a second operator keeps feeding the "mud" onto the revolving mandrel by hand. In time, the proper thickness of the first rough coat has been applied. These cores are then placed on end in steam coil dryers and kept there for 24 hours at a pre-determined temperature. Many cores require a double layer of "mud" to build it up to the proper diameter, while others just require the first application. In either event, the hand sanding operation produces excessive concentrations of silica dust with resulting exposure to all of the operators concerned. As may be seen in Figure 3, a longitudinal ridge is left on the core face. This ridge cannot be smoothed off while the "mud" is moist. The usual procedure is to stand the dried core on end, use sandpaper, a leather glove or a piece of fine mesh screen and rub off the ridge. This ridge must be removed from either the first or second layer of "mud" or it produces a ridge inside the tube when it is cast.

A chemical analysis of settled dust from one plant, taken from the top of an oven 7′ 0″ above the floor showed 35 per cent free silica, while a sample of dust from the floor where the core sanding operators were stationed showed 58 per cent free silica. At another plant settled dust over an oven door carrier showed 42 per cent free silica while a sample of dust from the floor and from a bench adjacent to the core sanding operator showed 71 per cent free silica.

Concentrations of dust to which core sanding operators were exposed in the first plant showed a value of 125 M.p. per cu. ft. of air while in the second plant a count of 265 M.p. per cu. ft. of air was obtained.

The nature of the exposure and the dust concentrations involved precluded any arguments as to the necessity or desirability for immediate and effective control. The basis of the control was already present in every one of the plants involved, namely the core benches themselves.

Sketches were prepared right on the job during the period when the engineering survey was being made. A screen-top hopper was suggested under the cores to be sanded. One company had an old, unused industrial vacuum cleaner, so they connected it to a 1½″ dia. stub at the rear of the hopper. The sanding operation, instead of being performed in an up-and-down manner, and quite vigorously, is now performed with the core and mandrel in a horizontal position on the core lathe while the operator slowly passes his glove or sandpaper or mesh screen over the ridge and then the body of the core, if found necessary to bring the ends to the proper diameter. Maximum concentrations resulting from this latter technic are about 1 M.p. per cu. ft. of air. Housekeeping was so improved that the management of one plant is equipping similar operations in five of its plants with exhaust, though fans are to be used for suction instead of a vacuum cleaner.

Air determinations over the unit connected to the industrial vacuum cleaner were made with the heated thermometer anemometer. Readings were taken on the longitudinal center line of the 9″ wide screen top of the hood. Both thermometers were held about 1″ apart and about 2½″ above the screen top. Four volts were used in taking the readings. Results indicated a face velocity of approximately 68 f.p.m., quite low for normal industrial practice. The effectiveness of the screen top and the decided change in operator technic does not require any larger face velocity—gravity also helping to drop the fines to the hopper. For a fan installation at another plant, it was suggested that 375 c.f.m. be exhausted through the screen-top resulting in a face velocity

of 104 f.p.m. A 5″ dia. exhaust connection is necessary resulting in a pipe velocity of 2,800 f.p.m. with this higher air volume. A twin hopper, each with a 3½″ dia. tap, connecting to a 5″ dia. exhaust is a more effective arrangement. The same air volume per bench is to be exhausted as for the single hopper.

One installation is complete and operating successfully with the industrial vacuum cleaner as the source of suction, another is in the process of installation, while a third plant, due to the use of a new extruding machine, has discontinued the manufacture of 90 per cent of the sand cores previously found necessary in the older method of casting tubes. The cores which are necessary to be made for the larger tubes are sanded with the mandrels on end due to the excessive weight of both steel mandrel and core, and the operators are supplied with and use approved type respirators for their protection against the inhalation of the high silica dust developed during the sanding operation requiring approximately one hour every day for its completion

The elimination of this exposure is based on chemical and engineering control.

BENZOL

Benzol, in spite of its toxicity, still maintains its position as the most valuable and effective industrial solvent.

Medical control, through the utilization of the urine sulphate test for the determination of benzol absorption previous to definite systemic poisoning, was the medium through which a serious benzol exposure was brought to light. Benzol has been used in various departments of one plant for a number of years. The use of the urine sulphate test for all of the operators involved throughout the plant soon demonstrated that though some of the percentages of inorganic to total sulphates were somewhat below what is considered normal, in the majority of cases they could be dismissed. When an analysis was made of the data pertaining to operators in the hand lacquer dipping division, certain pertinent facts were disclosed. Different types of lacquers, necessary for the varied work being processed, required varying amounts of benzol as a solvent. When the percentage of benzol reached certain proportions, and this only occurred in certain operating sections, thus localizing the problem, the urine sulphate test immediately demonstrated potential danger to the operators involved. The problem narrowed itself down to two operators who were most seriously exposed. Both of these men have been in this department for years without any apparent outward manifestation of physical disability. One is tall and heavy set while the other is short and slim. For a period of 3 months, operator "S," the heavy individual, seemed to be failing in health. During this period, 7 urine sulphate tests were made, and 2 of the early samples showed a 34 per cent ratio—definitely in the danger zone. The smaller of the two operators, to be designated as operator "P" showed normal ratios during this same period. A reason for this is to be advanced later in this discussion. Operator "S" was then transferred from the benzol exposure to other work in the department. During this period, 6 urine sulphate tests were made and they appeared quite normal. In the meantime, the ratios of operator "P" were swinging up and down, though no alarm was felt for him because he did not become ill.

It was during the transfer period of operator "S" that the bureau was called upon for help. A complete engineering survey was made of four hand lacquer dipping stations. Coincident with this survey atmospheric determinations were made to ascertain the exposure of the operators to benzol during cycles of their operations. This was

obtained by the use of nitrating tubes containing concentrated sulphuric and fuming nitric acids—the results being determined colorimetrically. The values obtained ranged from 22 to 63 p.p.m. Our bureau regulations require that benzol should not be present in concentrations over 100 p.p.m. This is based on pathological data and experience, and in the majority of instances may be entirely justified. However, this one plant experience of illness and concentrations below 100 p.p.m. seems to add to the picture of experience recently presented by Dr. Elkins, of Massachusetts. It is not intended, at a gathering such as this, to argue one way or another about a problem of such importance. This we will graciously leave to the chemists and pathologists. Since effective control must always be predicated on the work of these two groups, this control must of necessity be flexible so as to be varied as knowledge concerning the pathological effects of low concentrations of toxic materials over prolonged periods of exposure, is evaluated.

In spite of the low benzol concentrations found, and aside from the state regulation in the official report presented to the executives of the organization, it was suggested that ventilation be installed, as a matter of good industrial practice. It was also suggested that the urine sulphate tests be continued until after all control measures had been installed and for some time afterwards. Atmospheric determinations would then be made to determine the effectiveness of the control measures suggested and installed.

One of the four lacquer dipping sections may be designated as the east unit, while the other three, where operators "S" and "P" are located may be designated as the west unit. The east unit will first be discussed.

No control of any kind was provided over the dip crocks. The steam heated drying oven was provided with a 13" wide hood extending over the entire 6' 0" width of the oven and located above the doors. A 7" dia. exhaust duct was connected to the center of this hood. Eight 2½" dial holes had been cut in the two front doors of the oven presumably for venting purposes.

Based on the engineering recommendations contained in the report of the study, and in consultation with our bureau, engineering data were developed and drawings made for changes in this east unit. The lacquer was contained in crocks. These crocks were set in metal containers to catch any drippings and this latter container was set in a ventilated metal shell. This ventilated shell is set 3" above the inner metal container so that any heavy vapors dropping from the racked work as it is withdrawn from the crock will not spill over to the work area. Each ventilated shell is connected to a 5" dia. duct, exhausting 300 c.f.m. at 2,200 f.p.m. in this connection. The air velocity between the metal shells is 170 f.p.m.

All crocks are supplied with hinged metal covers and are kept in place except when the specific crock is being used. If only one lacquer crock is being used, there being two lacquer crocks, one drain crock and one special wash crock, the ventilation is continuously operating, the covers on the unused crocks are kept closed and air is exhausted from between the shells of all four crocks. To prevent air currents from overhead monitors or drafts from adjacent openings in the partition walls affecting the exhaust system, a hinged top enclosure was installed over all of the crocks. The location of the forward edge of the hinged top was determined by studying and correcting operator technic, when the racked work was being withdrawn from the dipping operations. The control about these crocks has completely eliminated any odor of benzol in this work area and has defi-

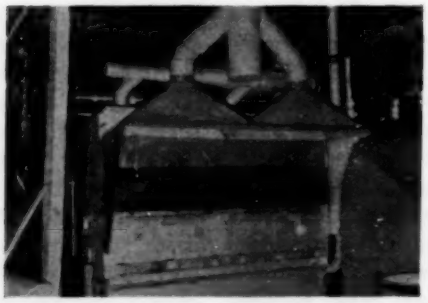
nitely prevented the dispersion of any benzol vapors to adjacent operators.

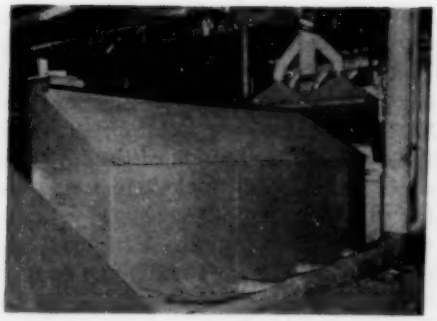
Three modifications at the oven finally cleared the work area of all benzol odors. The eight holes in the oven doors were sealed with metal discs. A 4″ dia. exhaust tap was connected from the bottom of the oven to the main exhaust line and supplied with a slide type blast gate. This 4″ duct is used for purging the oven of the heated benzol vapors and lacquer odors. This blast gate is only slightly "cracked open" and the exhaust is so nicely balanced that the oven temperature necessary for proper drying has been maintained. When the oven doors are open for removal of the racked material, no odors or vapors are discharged to the operator's breathing zone and then dispersed to the general work area, due to the oven being under a slight suction.

The original 13″ wide, single hood over the front of the oven was removed and a double 20″ wide hood substituted. A 6″ dia. connection to the top of each hood section exhausts 500 c.f.m. at 2,550 f.p.m. velocity in each connection. This 1,000 c.f.m. exhaust provides 100 f.p.m. velocity on the under side of the hood, too low for normal hood exhaust. In view of the expected and resulting excellent purging of the oven, this low face velocity was found to be sufficient. Draft guards, one on each outer side of the hoods, 28″ long and tapered from 20″ to 10″ prevent side air drafts from whipping any

FIGURE 4

Close-up of double hood arrangement with draft guards in place





Rear of enclosure over crocks showing exhaust piping arrangement from shells

Crocks set in ventilated shells inside of enclosure—center lacquer crock being used

benzol vapors or lacquer odors out of the oven when the doors are opened.

The installations just described for the east unit are shown in Figure 4. Crocks, inner and outer shells, hinged covers, enclosure over the shells and crocks, exhaust system from ventiltaed shells, oven hoods and exhaust connections and draft guards are clearly shown. The ventilation about the crocks and the purging of the oven were the main control items in the east unit.

The west unit presented exhaust problems not present in the east unit just described. There are three operating stations, though the two outer units are normally used. Each unit consists of three lacquer crocks, two sets of mechanisms for rotating the mesh baskets, containing dipped work, to remove excess lacquer and two steam heated drying ovens. Benzol is disseminated from dipping, rotating, and drying operations—the worst dissemination point being the ovens.

The three units are set in line, operator " P " being located at the farther unit near a large opening in the partition wall, while operator " S " is located at the third unit in the line. There was no control of any kind originally provided for any of these units. The only air movement provided was by the fans in the oven set-up which recirculated the benzol-laden air through heater and work.

The prolific source of dispersion was from the leaky ovens. Sheet metal screws and cement were freely used and all open joints and loose sheet metal parts were made absolutely tight. The focal point of attack for control was at the rear unit where operator "S " is located. The discharge from the circulating fan, set on the floor, is to a baffled opening in a heater casing set over the fan. The fan connection was not tight, so that a major portion of the benzol laden air being drawn from the bottom of the dryer housing was discharged against the baffle and was then deflected to the floor. The velocity of discharge and the fact that these vapors were hot aided in their dissemination to the breathing zone of the operator and then to the general work area of the department. The large opening in the partition wall near where operator " P " is located caused an appreciable draft from operator " P " to operator " S " with the result that the odors of benzol and lacquer were decidedly annoying and irritating at the latter work station—this in spite of the fact that approximately the same benzol concentrations were found at each work station, namely 63 p.p.m. The absence of odors eliminated operator " P " from consideration for the time being, and his potentially dangerous condition was only demonstrated when the bureau plotted the results of the urine sulphate tests. This will be discussed later.

A sheet metal casing was dropped from the bottom of the heater casing to the floor, entirely enclosing the cast iron fan casing. A 4″ dia. exhaust duct, provided with a slide type blast gate, similar to that installed for the oven at the east unit, was connected from the oven to an exhaust line. The sealing of all open joints in this oven, together with its proper venting and baffling of the lower section of the heater casing about the fan immediately produced a remarkable change in the working area. This was decidedly noticeable as operator " S " worked between two ovens, as did operator " P " but the former was also in the zone of the draft from operator " P " carrying benzol vapors from the farther operating station.

Since the work to be hand-lacquered was contained in heavy mesh baskets and not racked as at the east unit, a large shallow enclosure, almost like a spray paint hood was developed. The weight of the basket and its material necessitated a 1¼″ dia. pipe rail support for

the operator so that he could grasp this support when he lifted the basket from the dip crocks. These crocks are supplied with annular ventilated shells similar to that at the east unit. It is contemplated that the height of the hood will be reduced so that the operator's head will not be in the hood above the crocks when dipping is being performed. The weight of the basket and work may preclude this.

Up to the present time, effective control has been provided only for operator "S." Due to the results from this one work station, an engineering layout was prepared and approved by the management for all three operating sections of the west unit. Location of dipping crocks, rotating mechanisms and ovens have been rearranged to facilitate easier handling of the work and to aid in the ventilation of these dispersion points. Work is at present being done in connection with this major operating change.

The new layout includes a ventilated enclosure for the rotating mechanisms while the basket and work are rotated to remove excess lacquer, and an exhaust tap is to be provided for the drip container under each mechanism to remove any possible benzol vapor collecting in these containers.

Brass wheels in the fans and completely grounded systems were recommended for all of the systems involved.

Some significant points relative to the plot of the urine sulphate ratios may be mentioned:

1. To date, 35 samples of each operator have been plotted.

2. The sample taken on March 23 of operator "S" a short time after his return to the benzol exposure, and apparently after his system was cleared of benzol, showed a ratio of 31 per cent—the lowest it had ever dropped to.

3. The gyrations of the ratios of operator "P" may be explained by the fact that when the center of the three dipping units is in operation, for some unknown reason the area between this unit and operator "P" is heavy with benzol and lacquer odors, this in spite of the draft from operator "P" toward the center unit. Personal susceptibility may also be an important factor here. This may possibly be eliminated because the ratio of 59 per cent on August 10 resulted from the operation of the center unit, which also accounts for the jumps in February and March. The center unit is used periodically and only on special work.

This benzol exposure has been discussed at great length, first due to the toxicity of the material and second due to the possible change of our knowledge of the effects of continued low concentrations over long operating periods. If the data of Dr. Elkins or Dr. Hunter are to be viewed in their proper light, trouble is to be expected from further exposing operators "S" and "P" to this toxic solvent.

The careful development of proper and adequate engineering controls for the protection of industrial health against occupational exposures means that each problem encountered requires a "tailor-made" analysis. This factor should never be lost sight of because in the final analysis a life may depend on the effectiveness of the control utilized.

DISCUSSION

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THIS paper outlines four specific ventilation problems and describes the solution of each. We are not inclined to disagree with any of the statements in the paper, and take the opportunity to direct attention to several outstanding items.

In each instance the ventilating equip-

ment has been designed in a systematic and logical manner. The designer has decided the direction in which the air should move and has arranged the duct terminals accordingly. This seems to be a rather simple matter but, nevertheless, is frequently neglected. We recall an instance where three sources of ventilation were applied to the same job. One source tended to move the air inwardly, one outwardly, and a propellor fan produced a strong transverse flow.

The illustrations show the importance of placing the terminals as close as possible to the sources of contamination. In this way adequate ventilation may be obtained without moving an undue volume of air and without involving an undue expenditure for equipment, power, and heat.

The conditions near the rolling mills were unpleasant but apparently did not cause illness. These situations are not uncommon, and it is frequently difficult to decide what should be done with them. In this particular instance the source of contamination was relatively small and, although somewhat inaccessible, could be ventilated without undue expenditure for equipment or power. The degree of ventilation shown makes it unnecessary to be concerned with the concentration and toxicity of aldehydes or other acrid substances.

The section dealing with the lead exposure involves three rather typical situations:

The first is the use of proprietary preparations, without much knowledge of their composition. The second is the use, in the interests of economy, of equipment at hand. The results frequently are not very satisfactory. The third is the tendency for consultants, who are not financially related to the job, to handle the phase of the problem in which they specialize in an effective manner but to overlook some of the important economic details.

The illustration displayed in describing the silica problem shows the duct terminals close to the source of the dust. In this way adequate dust removal is obtained without using an excessive volume of ventilation.

The description of the benzol exposure suggests questions regarding the toxic limit, individual susceptibility, and the interpretation of occasional measurements. These rather difficult questions probably do not arise in connection with the ventilation system shown. In many instances, however, the sources of contamination are so large that the complete removal of the objectionable substances would be prohibitively difficult and prohibitively expensive.

Accuracy of Plate Counts Made from Milk Products as Affected by the Temperature of Incubation*

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A NUMBER of years ago studies were begun on the efficiency of various bacteriological incubators used in milk control work. It was felt at that time that some of the discrepancies in bacterial counts obtained between different laboratories examining the same sample of milk or between duplicate platings of a sample in one laboratory were due in part to faulty incubation. It was generally assumed that incubators were quite accurate and that incubation of plates at a temperature of 37°C. for 2 days was entirely satisfactory.

That the first assumption was faulty was shown by various workers as noted in the review given by Pederson, Yale, and Eglinton.[1] It was also noted by Pederson and Yale,[2] and Yale and Pederson [3] that 32°C. for 2 days was a better temperature for incubation of milk plates than 37°C. for 2 days, since there was less error in plate counts caused by variations in temperature in the incubator, and the counts obtained were a more constant percentage of the total maximum count obtainable.

These results were in line with observations from various laboratories in which it had previously been observed that 30°C. was a better incubation temperature for dairy products than 37°C. The findings reported by Pederson and Yale [2] have been corroborated in other laboratories, and results of studies have been summarized by Kelly,[4] Yale,[5] and Abele.[6]

Studies on the temperature of incubation and the various types of incubators have been continued by the author. Up to the present time 22 different laboratory types of commercial and experimental bacteriological incubators have been examined.

It is not the purpose of this paper to criticise individual incubators in regard to the various factors that determine their usefulness but rather to discuss how the incubation influences the plate counts. The incubation conditions attained in many incubators now in use, as noted in previous reports, are so poor that these inadequate incubators cannot qualify for milk work under the specifications given in *Standard Methods*.[7] These methods specify an incubation temperature of

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37°C. with a tolerance from 35° to 37°C., and a construction that will give suitable incubation. To comply with these conditions and to be satisfactory for use in the examination of dairy products, the temperatures in the incubator chambers must be both constant and uniform, that is, constant throughout the incubation period and uniform throughout the chamber; the temperature of the agar plates should be raised from room temperature to the temperature of incubation under constant conditions; and the incubator should be so ventilated that plates neither dry so as to make counting difficult, nor become so moist that the incidence of spreader plates is abnormal. The incubator should also be simple in operation and adjustment. Many of the anhydric incubators introduced within the last few years are better than those formerly sold, but it is doubtful whether an incubator which completely satisfies these conditions can ever be made. The correction of one fault is frequently made at the expense of another—for example, simplicity of operation at the expense of uniformity in temperature.

Two new types of forced circulation anhydric incubators have overcome difficulties caused by the slow heat transmission of water jacketed incubators, and yield incubation temperatures that are constant and uniform. However, at 37°C. a variation of 1.3°C. was shown in the better of these two which caused more than a 50 per cent variation in replicate plate counts. Therefore, incubation conditions are no better than those obtained in the water jacketed types. Other new types of incubators show temperatures that vary greatly in various parts of the incubation chamber and other faults such as too much or too little ventilation resulting in excessive drying of plates, or excessively moist conditions. In fact, the two extreme conditions of excessive moisture and drying are noted in different parts of the chamber of a single model.

Several attempts have been made to obtain greater uniformity in the temperatures in the incubation chamber by forced circulation. Some earlier attempts were unsuccessful in that air pockets were formed, thus increasing temperature differences as well as causing excessive drying of some plates. The two new models just mentioned are far better than earlier models, but it should also be remembered that the additional problem of caring for a motor has been introduced. Other recent incubators will yield incubation temperatures which vary only a fraction of a degree. Although accurate and satisfactory for certain types of research, these incubators are far too complicated and expensive for the routine milk control laboratory.

Many of the present types of incubators would be entirely satisfactory for milk control work if a temperature more suitable for incubation were used, that is, 32°C. Several of the present types of incubators will give temperatures within ±1°C. of any temperature in the 30° to 37°C. range. A variation of ±1°C. in incubating temperature at 32°C. causes on an average only a 4 per cent variation in count, while a variation of ±1°C. at 37°C. causes an average error of more than 25 per cent. The counts on various samples of milk when plates are incubated at exactly 32°C. will seldom fall below 95 per cent of the total maximum 2 day count that can be obtained, but even if incubated at exactly 37°C. the counts obtained may vary from 10 to 90 per cent of the maximum 2 day count. It is evident from these facts that many of the present unsatisfactory types of incubators which must be discarded if present standards are enforced, would be satisfactory for milk control laboratories if the present 37°C. temperature were changed to 32°C. In other words, there are a number of types of incuba-

tors which are satisfactory for use in milk work at 32°C. while at 37°C. even the best incubators cause very real and serious errors in counts.

If the errors which are due to failure to hold the temperature of incubation constant can be overlooked as is the case at present, it would seem reasonable to overlook lesser errors caused by faulty pipettes, dilution blanks, etc., some of which are now emphasized.

In conclusion it may be said that it appears to be impossible to make a perfect incubator for milk control work. Even if one were made and operated at 37°C., counts obtained in examination of milk samples would be subject to a considerable uncontrolled error. It therefore seems logical to change the temperature required for incubation to that temperature, that is, 32°C., at which slight variations have no material effect on the plate count and at which the counts obtained from various samples of milk would be a more constant percentage of the total maximum count obtainable.

REFERENCES

1. Pederson, C. S., Yale, M. W., and Eglinton, R. Temperature Variations in Bacteriological Incubators. New York Agri. Exper. Sta. *Tech. Bull. No. 213*, 1933.

2. Pederson, C. S., and Yale, M. W. Effect of Temperature of Incubation Upon Agar Plate Count of Milk. *A.J.P.H.*, 24:477, 1934.

3. Yale, M. W., and Pederson, C. S. Optimum Temperature of Incubation for Standard Methods of Milk Analysis as Influenced by the Medium. *A.J.P.H.*, 26:344, 1936.

4. Kelly, Ernest. Report of Collaborator on Coöperative Work with Proposed Changes in Medium and Temperature of Incubation. *29th Ann. Proc. Lab. Sect., Intern. Assn. Milk Dealers*, 1936, pp. 50–75.

5. Yale, M. W. Standard Agar Counts as Compared with Counts on Improved Agars at 32° C. *A.J.P.H.*, 28:148, 1938.

6. Abele, C. A. Results of Bacterial Plate Counts of Milk on Three Media and at Two Temperatures of Incubation. *A.J.P.H.*, 29:921, 1939.

7. *Standard Methods for the Examination of Dairy Products* (7th ed.), American Public Health Association, New York, 1939.

Newer Medical Methods of Appraisal of Nutritional Status*

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THE files of our hospitals must contain millions of records of physical examinations beginning with the classic line, "The patient is well nourished . . ." On countless school health examination cards one finds confident ratings of nutrition as "Good," or "Fair," or even the puzzling designation of "Very good" indicating some sort of supernormal state. In equally wide use are designations based upon height and weight indices leading to such classifications as "Undernourished—more than 13 per cent under average." Less frequently, more complicated indices are used based upon formulae involving a number of physical measurements.

The two methods referred to—the appraisal of nutrition based upon the clinical examination, and the appraisal based upon physical measurements—have found the widest use in school health work. Other methods of survey, of course, have been and are in use, such as dietary studies of families and individuals, and the observation of improvement, according to various criteria, of groups provided with supplementary feedings as compared with control groups. In the main, however, routine school procedure in the appraisal of nutrition bases itself upon the clinical examination or the use of physical measurements, or a combination of both.

The limitations of both procedures have often been pointed out in the literature. Nevertheless such appraisal permits the selection, with varying degrees of reliability, of definitely undernourished children; that is to say, of children suffering from more or less gross malnutrition. The fact that, at the same time, such methods result in the selection of some children who are not demonstrably undernourished, need not especially concern us. This error is not at all the chief limitation of such procedures of nutritional appraisal. The chief limitation is rather the failure of these methods to select those children who, while not suffering from obvious malnutrition, do have a nutritional impairment which deprives them of abundant health and full vitality. It is this borderline between a level of nutritional status at which obvious illness occurs, and a level of nutrition which permits the fullest realization of individual potentialities which is our immediate concern. This borderline, which has been termed the latent state, repre-

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† Study on Medical Evaluation of Nutrition Status, a cooperative investigation of the U. S. Public Health Service, New York City Department of Health, Cornell University Medical School, and Milbank Memorial Fund.

sents a condition of nutritional deficiency, the signs of which are not detectable by the ordinary methods in common use.

The importance of the latent state must be emphasized because the use of methods of diagnosis in school work and other public health surveys which will permit its specific diagnosis will open new possibilities of combating nutritional impairments. In the first place we know that we can most easily and economically prevent the development of manifest disease states if we are able to deal with the earliest deviation from normal. In the second, even though the latent state is not characterized in itself by obvious health impairment, we cannot rest content with the existence of a minimum or average level of nutrition and health, but must direct our efforts toward the promotion of the fullest degree of well-being. Finally, as progress is made in dealing with ever earlier stages of nutritional impairment, we approach our ultimate objective of prevention itself.

The late Lord Moynihan expressed this point of view very precisely. "The ultimate object of all attacks upon disease," he said, "is the discovery of methods, not so much of curing established disorders, as of checking them in earlier and still earlier stages of their career, and finally of preventing their incidence and development."

From this point of view the latent state of malnutrition is regarded as a medical problem, no less important in its specific characteristics, let us say, than latent tuberculosis or latent syphilis. Therefore, as an essentially medical problem, the latent state of malnutrition requires specific medical methods of diagnosis.

Such specific medical methods are not lacking today. In recent years progress in the field has been rapid indeed. Studies of manifest deficiency disease on the one hand, and of deficiency states induced in laboratory animals on the other, have led to the development of a number of specific chemical and physiological tests for specific nutritional deficiencies. Many of these tests find current application in hospitals and clinics.

It is on the order of the day, therefore, to bring these newer medical methods of nutritional appraisal into the field of public health work; to test them, not only in themselves, as methods, but in their applicability to large groups in survey work; to select, refine, and simplify so that with the greatest economy of effort the widest possible application of specific nutritional tests may be made to secure as reliable information as we may on nutritional status.

In pursuit of this goal, a comprehensive study of nutritional appraisal has been under way in New York City during the past year. It is planned and organized on a coöperative basis by the Cornell University Medical College, the U. S. Public Health Service, the New York City Department of Health, and the Milbank Memorial Fund, and is assisted by the Work Projects Administration.*

Its purpose is twofold: (1) to study the newer medical methods for diagnosis of latent nutritional deficiencies and to determine the most appropriate means of organizing the several procedures into a feasible system which may be applied to schools and other large groups of the population; (2) to determine the prevalence of specific nutritional deficiencies in a large sample of the population.

The study is conducted in the Seward Park High School, a public senior high school of New York with an enrollment of approximately 6,000 pupils. Participation of the pupils is voluntary, and approximately 4,000 requests for

* Official Project Number 665-97-3-68.

examination have been received. Approximately 1,000 pupils were examined between March and June of 1939.

The procedures of the study include clinical and dietary investigations, hematological examination, chemical tests on fasting blood specimens, and physiological tests. A detailed report of the methods and procedures is in preparation.*

A brief discussion of two examples of the laboratory procedures may serve to illustrate the relationship and implications for nutritional appraisal of the entire program, and some of the problems in method and interpretation as well.

Let us consider first some of the hematological procedures.

Not only diets inadequate in iron, but other factors as well may operate to produce a deficiency state, nutritional anemia. When well marked, pallor alone will permit a diagnosis based upon simple inspection. But this is not the case with anemias that are of less than marked intensity. It is difficult for clinicians to judge the presence of moderate anemia with certainty from the appearance of pallor, and of course impossible to assess its severity. If we wish to determine, therefore, whether nutritional anemia is an important and frequent manifestation of deficiency disease in a given community —as for example, a school—the use of objective hematologic methods is imperative. In the present study, the hemoglobin content of whole blood, the hematocrit, or volume of packed red blood cells, and the red blood cell count are determined. It seems to me that two aspects of these procedures deserve emphasis: the question of method, and the question of "normal" values.

It is unfortunate that hemoglobin determinations are often of small value because the method employed is of low reliability. It is easier to do an accurate hemoglobin determination colorimetrically than a less accurate determination by means of the more tedious older methods.

The "normal level" or, better, the "optimum range" must be determined for evaluation of the results of a given survey. It would appear that studies of children reared under especially favorable conditions in families of high economic level in the same geographic area would provide the most suitable basis for the establishment of such an optimal range. This is true, of course, not only of the hematological studies, but of all the measures of nutrition with which we are working. The study is preparing to undertake the examination of school children of high economic level, using the same procedures now employed in the examination of poor children.

Scurvy, the manifest disease of vitamin C deficiency, occurs but rarely in urban children of school age. Nevertheless, there is considerable evidence that many individuals present significantly lower blood plasma levels of vitamin C, as determined by direct chemical measurement, than those living in favorable circumstances in families of high economic level. The question arises as to whether this also represents a "latent state" of malnutrition, and, if so, whether it occurs with remarkable prevalence.

The study includes, therefore, as one procedure in its system of examination a blood plasma ascorbic acid determination. Again, the question of reliability of method must be stressed, and a critical study of methods will be the subject of one of our subsequent reports.

In an effort to obtain more direct evidence of the presence of a latent state of vitamin C deficiency, a physiological test is used in addition to the chemical determination. A physiological test used in detecting the latent state

* This report is scheduled for publication in *Milbank Memorial Fund Quarterly*, Apr., 1940.

has been defined as the application of an exaggerated stimulus or stress in order to elicit signs which occur naturally in the manifest deficiency disease. With reference to vitamin C, a test of capillary resistance is the subject and method of study.

The exaggerated stimulus consists of the physical stress of a partial vacuum applied to the skin for a specified interval of time. The sign elicited is, of course, the occurrence of hemorrhage as petechiae or gross suffusion.

The test has seen fairly wide use in recent years in conjunction with studies of vitamin C nutrition. Some investigators are of the opinion that the test is of value in revealing subnormal vitamin C nutrition, but more often than not such investigations have led to confusing results.

We believe that inappropriate methods of testing and unreliable test procedures and criteria for rating of test results may account, in part, for this confusion. Moreover, the assumption that a physiological test and the corresponding chemical determination necessarily are closely correlated does not seem to be warranted. One may mention latent tetany in which the blood calcium and the neuromuscular electrical reactions do not always go hand in hand.

In the appraisal of vitamin C undernutrition, the latent state will escape us completely if we must rely only upon our clinical judgment or indices of nutrition. But both chemical and physiological tests offer the possibility of simple and direct specific appraisal.

It is from the same point of view and with the same critical testing of methods that the study includes tests of dark adaptation with reference to vitamin A, galvanic tests of neuromuscular response, roentgenograms of bones, and chemical determinations of blood serum calcium, phosphorus, and phosphatase. Detailed clinical examinations and dietary records provide data with some bearing on etiology.

If we are to accept present criteria, which we are by no means convinced are optimum, the range of values which we obtained in certain of these tests appears to indicate—although our collection of data is not yet complete—a significant prevalence of nutritional disturbance. Since these escape the simple medical inspection it would seem that specific biochemical and physiological tests merit consideration as a part of routine health examinations.

As the study progresses, it may be anticipated that a series of tests will emerge, feasible in public health survey work, and yielding information on the occurrence of specific nutritional deficiencies, which eludes our ordinary methods in common use.

With more widespread use of specific medical methods of nutritional appraisal, the nutrition problem will be more clearly defined, and a more substantial basis will exist for all phases of public health nutrition programs.

The Importance of Economical Milk in Human Nutrition*

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THE most recent figures available from the National Resources Committee [1] on Consumer incomes, indicate that nearly half the families in the United States in 1936 had incomes of $1,000 a year, or even less, and about half of these families have been on relief at one time or another. Similar figures lead to the estimate that the middle American family in that year had an income of $1,160 or just about $20 per week.

Imagine, if you can, what a job it would be to pay house rent, clothe the family, try to give the children some education, and, above all, feed the family for good nutrition on that income.

Dietary studies undertaken during the past year through various state experiment stations [2] indicate that many groups are inadequately fed. While families of employed wage earners and clerical workers in cities [3] spent from 25 to 40 per cent of their income for food, a very large percentage of the so-called "good diets" fell short in their allowances of the essential protective foods. These same surveys indicate that these diets were most deficient in milk and the green colored and leafy vegetables. In every region families spending a small amount of money for food used only a small quantity of milk. In fact, it was obvious that the average diets include only from one-half to two-thirds as much milk as they should, and when food expenditures went down for city clerical workers, the consumption of milk and dairy products went down at the same time.

The fact that milk consumption generally is far below the standards set for good nutrition leads us to estimate that a part of the inadequate feeding and lowered general well-being encountered is the result of a too low milk intake. All the more reason, then, why families who have little to spend for food must have economical milk and milk that can be used easily by a possibly debilitated intestinal tract. This need for a safe, easily digested and economical whole milk supply has focused attention on the place of evaporated milk in human nutrition. Research has gone far in giving a better understanding of the nutritive value of evaporated milk, its effect on growth and general nutrition. Much of the work has been summarized previously [4]; thus, for the most part, this paper covers summaries of the later reports.

Recently, Roberts and coworkers [5] reported studies showing the effect of evaporated milk fed to a group of institution children in Chicago. Growth in height and weight and the ossification

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of bones of the wrist as an index of anatomic age were considered. The addition of one pint of diluted (1:1) evaporated milk to a rather mediocre institutional diet proved a factor of safety. It supplemented and made more nearly adequate an inadequate diet. By all methods of comparison, the growth of the children given evaporated milk exceeded that of those not receiving the supplement. Somewhat greater progress was also noted in the osseous development of those children receiving evaporated milk.

As early as 1913, Brennemann [6] explained the favorable results obtained with boiled milk in infant feeding on a curd character basis. He held that the successful modification of cow's milk for infant feeding depended primarily upon the ability to alter the particle size of the curd formed in the stomach. Within recent years curd size and curd tension have become more or less accepted indices of the digestibility of milk and to a large extent of its suitability for infant feeding. There is no doubt that one factor contributing to the increasing popularity of evaporated milk in infant feeding has been the softness of its curd. Doan and coworkers [7] recently stated, "Since the effect on curd tension depends entirely upon the temperature used and the time of exposure, autoclaved milk and evaporated milk frequently exhibit no curd tension or a curd tension of zero."

These same workers presented data that would leave little doubt that evaporated milk was evacuated from the human stomach more rapidly than untreated milk, also that evaporated milk, like buttermilk and soft curd milk, traveled farther and disappeared more rapidly in the intestine of rats than hard curd milk. Their *in vivo* and *in vitro* studies [8] on the relative digestibility of various types of soft curd and hard curd milks led to the conclusion that evaporated milk and acidified milk show superior digestion characteristics. These milks, and to a lesser degree boiled milk, digested the most readily of all types studied.

Reynolds, Macy, and Souders [9] report similar results with children. They partly interpret this as being due to the fact that evaporated milk and acidified milk produce very small sized curd particles which accelerate gastric clearance, thus bringing the curds into the intestines for digestive action more quickly and in smaller aggregates, thereby allowing greater surface area for enzymatic activity. Seven children were studied to determine whether milk of different curd tension alters intestinal motility rates. Pasteurized, evaporated, and another soft curd milk were the milks used. Roentgenograms made at regular times indicate that the evaporated milk began emptying from the stomach in much less time than the pasteurized milk. All along the tract the evaporated milk was more evenly dispersed and in fluffier masses, thus presenting greater surface areas to the digestive juices than the pasteurized milk. Even in the colon these masses did not appear as compact and solid.

Such *in vivo* studies confirm the earlier work of Wallen-Lawrence and Koch [10] who observed that boiled and evaporated milk are attacked more rapidly by trypsin than unheated milk. They interpret this on the basis of the destruction by heat of a labile trypsin inhibitor found in the whey of raw milk. Flora [11] using animals, noted a similar increased tryptic activity with boiled and evaporated milk. Poole and Cooley [12] report evaporated milk is comparable to breast milk in the digestive tract of premature infants. Jeans and Stearns [13] by means of metabolic balance studies have indicated the suitability of evaporated milk in feeding both infants and children.

Hummel, Hunscher, and Macy [14] have shown that evaporated milk fed

to children consistently gave a larger storage of nitrogen, sodium, and potassium, and so an added impetus to soft tissue formation in these children. A larger potassium-sodium retention during evaporated milk feeding periods was a further indication that soft tissue formation was progressing at a faster rate. The nitrogen retention on evaporated milk was more than doubled in some cases and the acid-base mineral balance was equally great during this period. All of the children showed a positive retention of the basic elements, calcium, magnesium, sodium, and potassium as well as the acid elements, phosphorus, sulphur, and chlorine, and the calcium-phosphorus ratios were higher. When the subjects were taking evaporated milk, their calcium retentions were equally as good as with the plain fluid milk or even better. The children as a group, retained more calcium per kilogram of body weight when taking evaporated milk than when taking plain fluid milk.

Earlier work by Kramer, Latzke, and Shaw [15] with young adults, by Jeans and Stearns [13] with infants, and by Willard and Blunt [16] with young children, warrants the conclusion that from the standpoint of permitting good growth and high retentions of nitrogen, calcium, and phosphorus, evaporated milk compares favorably with raw whole milk. In fact, Willard and Blunt conclude that evaporated milk is a satisfactory source of calcium, phosphorus, and nitrogen, slightly superior to pasteurized milk. It is now recognized that milk nutrients are as efficiently metabolized from evaporated milk as from any other whole milk.

For years milk was looked upon as the perfect food. Then, finally, came the realization that milk is not perfect because it is low or deficient in certain constituents, but, in spite of these deficiencies, is one of the very best foods for old and young alike because milk furnishes more completely than any other single food and more economically the essential factors for good nutrition.

Milk and milk products are among the best sources of vitamin A. While relatively poor when compared on a weight basis, they are important because of the large amounts consumed. The earlier work of Farmer and Lemkau [17] comparing evaporated milk, raw and pasteurized milks collected at various seasons, as well as the milks before and after evaporation, after homogenization, after sterilization, and after storage for 6 months showed definitely there was no loss of this vitamin in the processing. More recently, Cannon [18] assayed both irradiated and non-irradiated evaporated milk, finding that the evaporated milks contained 4.28 International Units of vitamin A per gram or approximately 2,140 units per reconstituted quart. Steenbock [19] also contributed a vitamin A study of butter fat from raw milk and from evaporated milk, showing that the carotene and vitamin A content of the two were the same.

Even though milk is not an important source of vitamin B_1, considerable work has been done on the stability of the various fractions of the vitamin B complex in the processing of evaporated milk. The early work of Samuels and Koch [20] showed a loss of 20 per cent of the heat labile fraction of vitamin B. Bisbey [21] found approximately 25 per cent loss. More recent work by Knott [22] shows losses ranging from 20 to 30 per cent of the vitamin B_1 in the processing of evaporated milk, with as much as 40 per cent loss in the case of storage of over a year. In earlier studies on the nutritive value of pasteurized milk, Krauss [23] showed a loss of approximately 25 per cent of vitamin B_1 in that processing.

The work of Samuels and Koch [20] and also the work of Todhunter [24] on the heat-stable fraction of the vitamin

B complex, later called the flavin factor, shows there is no loss of this fraction in preparing evaporated milk. Inasmuch as Sebrell [25] has demonstrated that riboflavin is essential for human nutrition, evaporated milk being an economical source of this factor again becomes important to those families where the milk intake is apt to be low.

As early as 1930, the Bureau of Home Economics concluded, after working with families in South Carolina, that evaporated milk is the most practical food for the prevention of pellagra. Early analyses by Sebrell and associates [25] established evaporated milk as a good source of the so-called pellagra preventive factor. This was prior to the identification by Elvehjem [26] of nicotinic acid as the pellagra preventive factor. Recently, Elvehjem [27] has raised dogs on a diet made up solely of evaporated milk fortified with iron, copper, and manganese. The dogs developed no signs of blacktongue, the analogue of human pellagra. From all of this, then, it is safe to conclude that evaporated milk is a reliable source of nicotinic acid.

Improved methods of study [28] of vitamin C have indicated milk is an important source of this factor. Henry and Kon of England [29] present reports which indicate that at least half of the vitamin C content of evaporated milk is preserved. Meulemans and deHaas of Java [30] report only a very slight reduction in the vitamin C content of evaporated milk as compared with the original milk produced in that country. A comprehensive study has also been made in the laboratory of one of the large evaporated milk manufacturers. The results obtained were upon samples from 12 different evaporating plants. These data show evaporated milk 1½ years old retained almost 50 per cent of its vitamin C content. At 3 months, which is the average time elapsing between production and final consumption, this evaporated milk retained about two-thirds of its vitamin C. Macy and coworkers [31] report results of a study of 7 infants who received no vitamin C except that in evaporated milk. Their findings led them to conclude that evaporated milk furnished about one-fourth of the needed vitamin C for that special group of babies.

The Council on Foods of the American Medical Association accepts two methods of reinforcing evaporated milk with vitamin D—irradiation and the addition of a concentrate, as for instance the non-saponifiable fraction of cod liver oil. About 50 per cent of the country's evaporated milk supply is irradiated and about 10 per cent is reinforced with a vitamin concentrate.

Evaporated milk, as is all milk, is an ideal vehicle to carry extra vitamin D because milk is the most dependable source of the minerals, calcium and phosphorus, which are coördinated in activity with vitamin D. The ratio of calcium to phosphorus in evaporated milk as shown by Macy and coworkers [31] is correct for the body's best utilization. In a recent article, May [32] states that the linear growth and gain in weigth of 51 full term infants fed vitamin D evaporated milk was better than average in spite of the fact that the infants were handicapped to some extent at birth, being born of mothers from the class where prenatal care was limited. Macy [14] reports a stimulus to bone formation in older children as well as a more rapid rate of growth and height during the period when vitamin D evaporated milk was the milk supply. Thus, it has become an accepted fact that these reinforced evaporated milks, as shown also by clinical investigation of Jeans [33] and Stokes [34] will protect the normal, full term infant against rickets and contribute substantially to good growth of the infant and the older child.

To make a long story short, it is

evident that evaporated milk supplies qualitatively and quantitatively the vitamins milk is depended upon to supply.

Research undertaken has convinced those working with evaporated milk of its place in human nutrition and so has helped overcome unwarranted prejudices. During the past decade the use of evaporated milk in infant feeding has developed rapidly until today it is estimated from unpublished surveys that the majority of artificially fed babies are raised on evaporated milk and consume almost 10 per cent of the evaporated milk production. The conclusion of Jeans and Stearns [13] that the growth of infants on evaporated milk in length and weight was excellent and exceeded standard rates of growth has led to other studies of evaporated milk as the milk supply in the diet from birth through the 4th or 5th year. These studies, while as yet unpublished, will add to our knowledge of the sufficiency of evaporated milk in promoting growth, skeletal development, and in maintaining a state of good nutrition throughout childhood.

By way of closing, I should like to quote from a recent paper by Macy [31] in which she says:

> It seems reasonable to believe that evaporated milk has a definite value in the diet of the child. At times, objection to evaporated milk may be encountered on the grounds of unpleasant taste; however, these objections are, in the main, psychological and are more than offset by the ease with which this form of milk is obtained and kept sterile without refrigeration. Evaporated milk also permits ingestion in various concentrations.

Moreover, this form of milk lends itself to a degree of standardization and control unapproachable with the mammary gland.

Lillian Anderson, nutritionist with the Community Service Society of New York, tells us, in making recommendations for an adequate food supply for the family on a low income,[35]

> Many a toddler or school child has gone without an adequate amount of milk because a too expensive formula has been prescribed for the baby. Yet, the use of a less expensive but equally satisfactory formula could have made it possible to provide adequately for both children.

Thus the need is vital in human nutrition for an economical milk supply. Social studies show only too clearly that dietary adequacy decreases with income. Multiple dietary deficiencies inevitably accompany poverty. In the low-income group then, milk is more than ever important because it is unique among foods in its capacity to compensate for these deficiencies.

Workers in the medical, welfare, and public health fields are turning to evaporated milk recognizing that it supplies adequately the nourishment of milk at savings in cost as well as refrigeration, and with added safety and convenience. These factors strongly recommend evaporated milk in general family feeding particularly where economy is the link between nutritional need and fulfilment.

REFERENCES

1. *Consumer Incomes in the United States.* National Resources Committee, Washington, D. C. Dec., 1938.
2. *Agricultural Experiment Stations Report.* U. S. Department of Agriculture, 1939.
3. Stiebeling, H. U. S. Dept. of Agric. *Circular No. 507.*
4. Rice, Frank E. Protein, Minerals and Vitamins of Evaporated Milk. *A.J.P.H.*, 24, 3 (Mar.), 1934.
5. Roberts, L. J.; Blair, Ruth; Lenning, Blanche, and Scott, Marguerite. Effect of a Milk Supplement on the Physical Status of Institutional Children. *Am. J. Dis. Child.*, 56:287 (Aug.), 1938.
6. Brennemann, J. Boiled Versus Raw Milk. *J.A.M.A.*, 60:575, 1913.
7. Doan, F. J. Soft Curd Milk. *J. Dairy Sci.*, 21, XXI, 11:739 (Nov.), 1938.
8. Pennsylvania State College. *School of Agric. & Exper. Sta. Bull.* 380 (Apr.), 1939.
9. Reynolds, L.; Macy, I. G., and Souders, H. J. The Gastrointestinal Response of Children to Test Meals of Barium and Pasteurized, Evaporated, and Base-Exchanged Milks. *J. Pediat.*, 15 (July), 1939.
10. Wallen-Lawrence, Z., and Koch, F. C. The Relative Digestibility of Unsweetened Evaporated Milk, Boiled Milk and Raw Milk by Trypsin in Vitro. *Am. J. Dis. Child.*, 39:18, 1930.
11. Doan, F. J., and Flora, C. C. Comparative Digestibility of Some Soft Curd Milks in Vitro. *Bull. 380*, Penn. Agric. Exper. Sta. (Apr.), 1939.
12. Poole, Marsh W., and Cooley, Thomas B. The Care of Premature Infants. *J. Pediat.*, 1, 16 (July), 1932.
13. Jeans, Philip C., and Stearns, G. Growth and

Retentions of Calcium, Phosphorus and Nitrogen of Infants Fed Evaporated Milk. *Am. J. Dis. Child.*, 46, 69 (July), 1933.

14. Hummel, Frances C.; Hunscher, H. A., and Macy, I. G. The Influence of Fluid Irradiated and Evaporated Irradiated Milk on the Storage of Nitrogen and Acid-Base Minerals in Children. *Am. J. Dis. Child.*, 58:529 (Sept.), 1939.

15. Kramer, M. M.; Latzke, E., and Shaw, M. M. A Comparison of Raw, Pasteurized, Evaporated and Dried Milks as Sources of Calcium and Phosphorus for Human Subjects. *J. Biol. Chem.*, 79:283, 1928.

16. Willard, A. C., and Blunt, K. A Comparison of Evaporated with Pasteurized Milk as a Source of Calcium, Phosphorus, and Nitrogen. *J. Biol. Chem.*, 75:251, 1927.

17. Farmer, C. J., and Lemkau, A. M. Dept. of Chemistry, Northwestern University, 1930 (unpublished).

18. Cannon, Howard J., and Hixson, Orton F. Evaporated Milk—Effect of Irradiation on Vitamin A Content. *Indust. & Eng. Chem.*, 28:1009 (Sept.), 1936.

19. Baumann, C. A., and Steenbock, H. Fat Soluble Vitamins XXXIX. The Influence of Breed and Diet of Cows on the Carotene and Vitamin A Content of Butter. *J. Biol. Chem.*, 105, 1:167 (Apr.), 1934.

20. Samuels, L. E., and Koch, F. C. The [illegible]ative Quantities of the Heat-Stable and Heat-Labile Fractions of Vitamin B in Raw and Evaporated Milk. *J. Nutrition*, 5, 3 (May), 1932.

21. Bisbey, Bertha. Dept. of H. Econ., University of Missouri (unpublished).

22. Schultz, F. W., and Knott, E. M. Factors Affecting the Vitamin B_1 Content of Evaporated Milk. *Proc. Soc. Exper. Biol. & Med.*, 40:532, 1939.

23. Krauss, W. E. Ohio Agric. Exper. Sta. *Bull. No. 518*, 1933.

24. Todhunter, E. N. A Comparison of the Vitamin G Values of Pasteurized Milk, Evaporated Milk and Eggs. *J. Am. Dietet. A.*, 8, 1 (May), 1932.

25. Sebrell, W. H., and Butler, R. E. Riboflavin Deficiency in Man. *Pub. Health Rep.*, 53, 52:2282 (Dec. 30), 1938.

26. Elvehjem, C. A.; Madden, R. J.; Strong, F. M., and Woolley, D. W. The Isolation and Identification of the Anti-Black Tongue Factor. *J. Biol. Chem.*, 123, 1 (Mar.), 1938.

27. Elvehjem, C. A. University of Wisconsin (unpublished).

28. Whitnah, C. H., and Riddell, W. H. Milk as a Source of Vitamin C. *Science*, 83:162, 1936.

29. Kon, S. K., and Henry, K. M. The Effect of Commercial Sterilization on the Nutritive Value of Milk. *J. Dairy Res.*, IX, 1 and 2 (Jan. and May), 1939.

30. Meulemans, O., and deHaas, J. H. Batavia, Java. Netherland East Indies. The Vitamin A Carotene and Vitamin C Content of Canned Milk. *Am. J. Dis. Child.*, July 1, 1938.

31. Shepherd, Marion L., and Macy, Icie G. The Relative Effect of Different Type Milks Upon the Nitrogen and Acid-Base Mineral Retentions of Average Well Children. *Med. Woman's J.*, Jan., 1939.

32. May, Earl W., and Wygant, Thelma M. The Value of Irradiated Evaporated Milk in the Prevention of Rickets in Premature, Weakling and Normal Full Term Infants. *Arch. Pediat.*, LVI, 6 (June), 1939.

33. Jeans, Philip C. Vitamin D Milk. *J.A.M.A.*, 106:2066 (June 13), 1936; and *J.A.M.A.*, 106:2150 (June 20), 1936.

34. Rapoport, Milton; Krick, Elizabeth, and Stokes, Joseph. The Antirachitic Value of Irradiated Evaporated Milk in Infants. *J. Pediat.*, 11, 6:782 (Dec.), 1937.

35. Anderson, Lillian. Making Ends Meet. *Pub. Health Nurs.*, 31, 5 (May), 1939.

Public Health Education

PUBLIC education about tuberculosis, diphtheria and syphilis is always timely and necessary and it is most likely to register and to endure in the minds of the people, and to influence their attitudes and conducts when such public education is addressed primarily toward the attainment of some particular objective of great public concern, such as the establishment or enlargement of a sanatorium, the creation or extension of clinics and other case-finding services, or the provision or increase of public health nursing service. People learn best when they are stimulated to do something about a particular need or a given situation.—George J. Nelbach

Chemical Agents in the Prevention and Treatment of Experimental Poliomyelitis*

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IT is generally recognized that sera and vaccines are of limited value in the control of poliomyelitis. There is therefore every reason for exploring other possible means of checking the disease. Its distinctly neurotropic character and singular pathogenesis make it imperative that measures for its ultimate control be sought along new lines. We recognize that the control of virus diseases in general is made difficult by virtue of the intracellular relationship of these infectious agents. Unless the pathogenesis of the disease is such that the virus causing it must at some time or other stem an immune plasma to reach new cells, there is little one can hope to accomplish by attention to the humoral side of immunity. Under such conditions the only hope would seem to lie in the creation of a resistant state in the susceptible cells themselves by means sufficiently safe for practical use. But our knowledge of how to accomplish this is exceedingly limited so far as most virus diseases are concerned.

In poliomyelitis the general problem of prophylaxis and therapy is particularly complicated by the fact that the infection involves a special group of cells, which, unlike most body cells, are not individually restricted to a small domain, but extend to points quite distant from their origin. We have involvement here of a system of cells which from the standpoint of bodily ramification is comparable to the blood and lymphatic systems, but within which the virus is much less easily reached than it would be if its distribution depended on these vascular systems.

Whatever our beliefs may be regarding the common portal of entry in the natural disease, direct communications exist between free olfactory endings in the vault of the nose and the vulnerable motor nerve cells in the central nervous system; a communication which may well be compared to a long tube, or rather to a series of tubes laid end to end from the vault of the nose to the distal end of the cord and within which the virus may migrate to the point of its main attack. It is this hypothetical tube and its easy accessibility in the vaults of the nasal passages which present the fundamental considerations in this disease, for I believe that we must accept that the results of experimental studies speak definitely for an axonal

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spread of this virus. Unless the relationships in the natural disease differ fundamentally from those in the experimental disease, which I personally doubt, it is obvious that the problem of controlling this disease is one of either preventing the initial access to this system of "tubes" or curbing its progression within the system once it has reached it.

Let us consider first the prophylactic aspects of the general problem. Mention has already been made of the rather obvious fact that the motor nerve cells in the medulla and cord are more or less directly linked with the nasal vault by a series of neurons, the most peripheral of which are the dendritic endings of the olfactory nerve in the nasal vault. Whatever other portals may exist, here certainly is the one and only place where a virus which is strictly neuronotropic in its properties can find unclothed and entirely unprotected neurons extending beyond the general surface of the body. It is true, of course, that we do not know whether the virus does actually enter these exposed endings directly, rather than at some point further on. All we know with certainty is that in intranasally inoculated monkeys the virus proceeds to the central nervous system by the olfactory pathway and under normal conditions does so only by this route. Whether this first stride toward the central nervous system is strictly axonal or essentially perineural, or both, remains to be definitely determined. In the absence of definite information on this point something in the way of a working hypothesis must be set up. If it is assumed that the virus first enters into a union with the free endings of the olfactory nerve, rather than at some more central point, the approach then is to find some way of preventing access to this exposed portion, either by destroying these endings or by modifying their permeability for the virus. Should the virus not enter these endings directly, but first pass through the olfactory mucosa and enter into association with the nerve at some point further on, the problem then becomes one of finding some way of preventing its passage through the mucosa itself. It is therefore something of a handicap not to know where entrance to the nerve is effected. Thus far, we have been unable to elicit any definite anatomic evidence that the olfactory dendrites or the olfactory cell bodies have been changed in any way by a supposed direct invasion, although it is easy to demonstrate cellular infiltration in and along the olfactory nerve filia, beginning with the smaller bundles of axones directly under the olfactory mucosa and ending in the outer zone of the olfactory bulbs. Indeed, such infiltrations are constantly present in animals infected by the intranasal route and become demonstrable within a day or two after virus is instilled intranasally.

These then are the theoretical considerations and the general objectives. It is my purpose to summarize briefly the results of our studies. In doing so I may state, without any further preamble, that it is now firmly established that it is possible to render monkeys fully resistant to intranasal inoculation by the application of certain chemical agents to the olfactory mucosa. Indeed, a number of different agents when employed in certain concentrations and when applied in such a way as to cover all or nearly all of the olfactory mucosa will convey a state of resistance which is often quite lasting. Among the more active agents are alum, tannic acid, picric acid, mercurochrome, thionin, neutral acriflavine, and especially zinc sulfate. There are others which are also effective, but less striking in the duration of their effect. The duration of the resistant state varies with the agent used, with its concentration, and

with the thoroughness of its application. I shall not enlarge on these factors, but consider rather what we know regarding the mechanism underlying the protection so induced.

It is, of course, entirely possible that not all agents which might be found to exercise a protective action would owe their effect to exactly the same general type of action. My remarks therefore apply only to those which we have studied in sufficient detail. Regarding these it can be said that the prophylactic effect which they individually produce rest on the same general type of action, differing only in degree. All of them owe their prophylactic effect to a destructive action on the olfactory mucosa. This may in places be superficial enough to include only the dendrites, so far as the olfactory nerve itself is concerned, or extend deep enough to reach the lamina propria and therefore to include the cell bodies of the olfactory nerve (olfactory cells). The damage may extend to all of the mucosa, or may be patchy in distribution, leaving portions of the mucosa entirely untouched, a fact which proved misleading in earlier work. Thus far all of the agents which have proved to be protective have been found to exercise a destructive action on the olfactory mucosa. This, of course, does not mean that prophylactic effects induced by chemical agents must necessarily depend on such a destructive action. If this were true no further work in this direction would be justified. It is still possible that there are chemical agents which may be employed either for their selective effect on the dendrites alone, or for some more general, but non-destructive action on the olfactory mucosa as a whole. More work must be done to cover these remaining possibilities.

There are certain aspects of chemical prophylaxis in monkeys which are of especial interest. One of these is the frequency with which animals rendered fully resistant become susceptible again. This return to a susceptible state may occur within a period of several weeks, or not until after several months have elapsed, depending somewhat on the agent used and the thoroughness of its application. The question is, what is the mechanism underlying this return of susceptibility? Since the most uniform and solid protection is afforded by agents which more or less completely strip the olfactory epithelium from the lamina propria one may well wonder whether the elimination of the olfactory neuron constitutes the only factor in the protection; in other words, whether the general structure of the new epithelium may also play a rôle. However that may be, when special staining methods are employed one can regularly demonstrate not only olfactory neurons in the olfactory mucosae of these re-susceptible animals, but show that infection in these animals is always associated with a round cell infiltration of the olfactory nerve filia and of the olfactory bulbs. Of course, these neurons are usually much less widely distributed than in the mucosa of normal animals, but the fact that they have always been demonstrated in at least some portions of the mucosa and have always been associated with inflammatory infiltrations along the olfactory nerve filia seems to indicate the importance of an intact olfactory pathway in this return of susceptibility. There is a possibility that this restoration of susceptibility depends in part on a replacement of some of the olfactory neurons which have actually been destroyed, as well as on a regeneration of the dendrites of those cells which escaped destruction. This possibility is now under further investigation.

It would no doubt prove of interest to have the steps in the general repair of the olfactory mucosa discussed, but I must pass over this aspect merely with

the statement that the regeneration of the epithelium itself takes place rapidly and that the mucosa in time usually assumes a general appearance closely resembling the normal. I would like to insert at this point that the protection which is afforded to monkeys by zinc sulfate does not become fully effective until after the denuded lamina propria has been covered with a new epithelium, a process which requires 2 or 3 days. To this I may add that when infection is induced prior to this event, inflammatory infiltration may still be demonstrated along the olfactory pathway. This raises two questions: (1) Does the virus under normal conditions after all pass to the bulbs by the way of the perineural spaces rather than by the axones? (2) Is the return of susceptibility related to a gradual change in the new mucosa which ultimately makes it more permeable for the virus than it was during the earlier stages in its development? We are now endeavoring to obtain answers to these two important questions.

Summarizing this part of my paper, it is obvious that the results obtained thus far do not commend the use of chemical agents in the practical control of the disease in man, partly because of the risk of inducing a permanent impairment of the sense of smell, and partly because they imply that unless as extensive injury is induced in man as has been found to underlie the protection afforded to monkeys, little protection is likely to result. But, while it is clear that the results up to the present have little if any practical bearing, it is also true that the possibilities of chemical prophylaxis have not yet been fully explored.

I can only take time to say a few words about chemotherapy in acute poliomyelitis.

Theoretically, there are apparently two general ways in which a chemotherapeutic effect may possibly be realized: (1) by direct action on the virus, and (2) by the induction of such changes in the nerve cell as may serve to alter the pabulum necessary for the propagation of the virus or impede its migrations. The extraordinary resistance of the virus to various chemical agents, together with the unlikelihood that any chemical agent which actually entered the cell in a sufficient concentration to affect the virus might do so without injuring the cell, make the first of these two possibilities seem the more remote. During the past year we have tested the resistance of the virus *in vitro* against more than one hundred chemical agents, in such a way as to ascertain the relative effectiveness of the agents tested. Among the few agents which served to inactivate 1 cc. of a water clear virus suspension, containing 10–20 minimum infective doses of the virus, in dilutions of 0.1 per cent or less were the following: chrysoidine Y, congo red 4B, copper sulfate, hexylresorcinol, mercurochrome, mercury bichloride, oxyquinoline sulfate, potassium hydroxide, potassium permanganate, sodium formate, and trypaflavin. It is quite possible that there are substances which would prove active in higher dilutions. If so, these are most likely to be discovered by some such systematic survey as I have mentioned.

Therapeutic tests have been carried out with only one of the agents mentioned, namely, mercurochrome, the purpose being to defer such tests until after some highly active chemical had been found by *in vitro* tests, especially those which would in other respects be suitable for *in vivo* tests. In one experiment in which mercurochrome was administered intracordially to a group of 3 animals on 3 successive days preceding inoculation with virus intranasally (prophylactic application) all resisted infection, while all of an equal number of controls developed the disease. In another group, consisting of 4 animals,

in which the injections were begun on the day following intranasal inoculation, 2 animals escaped with only limited paralysis, while all of the controls developed extensive paralysis. Although we have not been able satisfactorily to confirm these results in subsequent experiments, they seem to suggest that it may be possible to accomplish something by means of agents which are expected to act directly on the virus in the infected tissue.

While our studies with virucidal chemical agents, applied therapeutically, have been limited, we have carried out a number of experiments in which it was hoped to gain a therapeutic effect by directly or indirectly modifying the vulnerability of the host. I can summarize the results of these experiments briefly by stating that artificially induced acceleration of the metabolism, the administration of such substances as vitamin B, viosterol and antuitrin S; of sulfanilamide, sodium sulfanilsulfanilate and sulfapyridine; also of several medicinal dyestuffs, used for their possible modifying action on the nervous pathways, all have failed to exercise any discernable therapeutic effect, though the treatments were started a day or two after the inoculation of the animals and were continued until paralysis appeared.

When we consider the problem of therapy during the acute stage of poliomyelitis it becomes evident that what is greatly needed to help point the way is information regarding the fundamental chemical processes underlying this disease. It is apparent that this aspect of the problem has been wholly neglected in our zeal for precise anatomic information and aspirations for immediate practical results. Therefore, in closing, I want to voice a plea for such studies, for it is apparent that we must dip more deeply into the basic processes of the disease if we are to proceed intelligently toward its control.

Studies of the Kahn Test

I. A Special Tube for the Preparation of Antigen Suspension

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THE standard method for mixing Kahn antigen suspension is to measure the antigen into one Kahn vial, the saline into a second vial, empty the saline into the antigen and as quickly as possible pour back and forth 12 times. There has been a twofold criticism of this procedure. First, it is

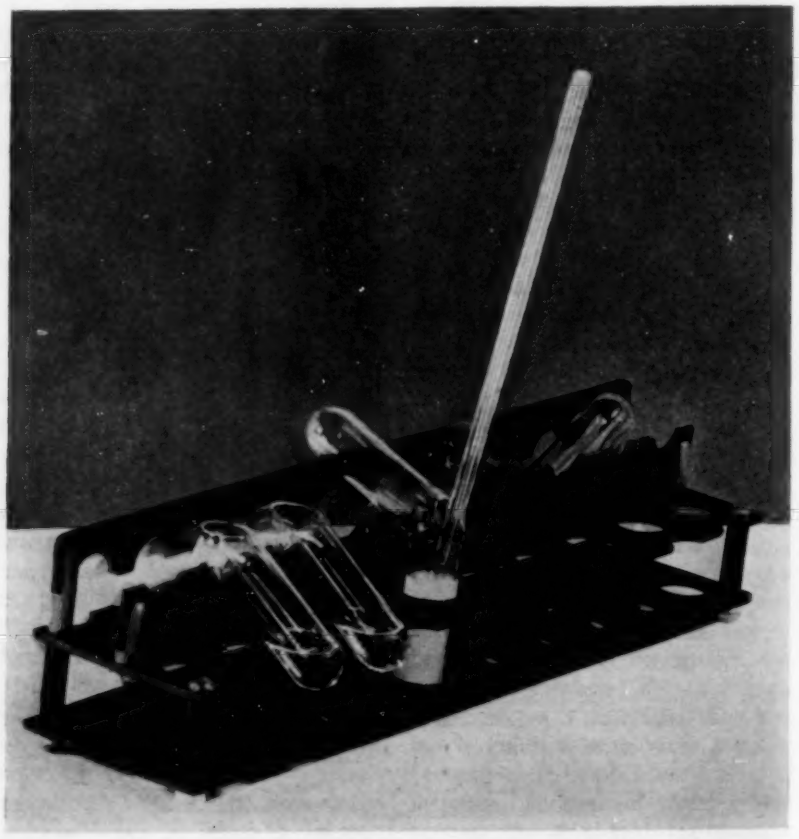

FIGURE 1—Special tubes and rack for the preparation of Kahn antigen suspension

practically impossible for even an experienced worker to make these multiple transfers of the solution from vial to vial without losing one or more drops; and second, because of the possibility of this spilling, different workers will vary the speed of mixing depending on their agility.

The loss of a few drops of the suspension after it has been thoroughly mixed is not of particular consequence. If, however, the loss takes place before the complete mixing of the antigen and saline the physical status of the suspension may be materially changed. The speed of mixing also alters the physical condition of the suspension in that there is a tendency toward an increased sensitivity as the speed of mixing is decreased. The first two or three transfers are definitely the most important in this regard. Presumptive antigen is more sensitive to these changes than standard antigen.

Spray [1] and Hinton [2] have each described methods of mixing antigen suspension in containers with separate compartments. Neither of these, however, is comparable to Kahn's standard method.

The use of the mixing tube described below permits standardization of the mixing of the antigen suspension without changing the fundamental principles of Kahn's method. The tube (Figure 1) consists of two arms each 5.5 by 1.5 cm. inside diameter at a 115 degree angle with an opening at the apex for filling and emptying. The opening is large enough to allow the entrance of a pipette and small enough to be easily covered when mixing. After the saline has been measured into one arm and the antigen measured into the other arm the suspension can be prepared by tipping the tube back and forth using the apex as an axis. A set rhythm can thus be employed in the mixing with no danger of losing any of the mixture.

For convenience a rack (Figure 1) may be used to hold the tubes during the pipetting of the saline and antigen, while the antigen suspension is being pipetted, and for draining after the tubes have been cleaned.

The cleaning of the tubes is accomplished by brushing in warm water containing a detergent and rinsing well in distilled water. If it is necessary to re-use immediately, follow the water rinsing with a rinse of alcohol.

REFERENCES

1. Spray, R. S. *J. Lab. & Clin. Med.*, 20:6, 1935.
2. Hinton, W. A. *Am. J. Clin. Path.*, 3:41, 1933.

Recent Investigations of Goat's Milk*

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INCREASED interest in the use of goat's milk has prompted producers and consumers to seek more detailed information regarding the relative merits of this food. The composition and properties of goat's milk are likewise of concern to those whose duties require safeguarding our milk supply. Surprisingly enough, however, reliable information dealing with the chemical, nutritional, and bacteriological properties of this milk are generally lacking. Claims abound of special properties as well as deficiencies of goat's milk, but when reviewed critically they often prove to be impressions without the support of controlled experimental evidence.

A few years ago the Bureau of Animal Industry inaugurated an investigation, the purpose of which was to make a detailed study of the nutritive value and related factors which make goat's milk a desirable food for the infant as well as for general use in the human dietary. Such a problem, if carefully controlled entails, in addition to the usual analyses, considerable experimental feeding work where results are evaluated largely in terms of their comparative values with other foods. Human milk being unavailable, cow's milk was used as a basis of such comparisons. This provided a suitable control as well as an intelligent appraisal of the value of goat's milk in light of accepted standards for cow's milk. Results of the study have recently been published.[1]

Among the milk goats in this country the Toggenburg and Saanen breeds are the most numerous. In milk production and percentage of butter fat they occupy the same relative position among milk goat breeds as do the Holstein cows among the dairy breeds. Furthermore, these high producing animals supply a large part of the goat milk coming to the attention of public health officials. Since Saanen and Toggenburg goats provided the milk for this study, a critical review of the goat milk data of the experiment as well as its evaluation in terms of Holstein cow's milk would appear to be of particular interest at this time.

Goat's milk for these studies was supplied by the bureau's milk goat herd, located at Beltsville, Md., which consisted of both purebred and high grade does, in approximately equal numbers of the Toggenburg and Saanen breeds. The cow's milk was furnished by a nearby pedigreed Holstein herd. The milks were considered representative of their breeds and were produced in accordance with approved dairying procedures. Preliminary investigation failed to reveal differences in the chemical composition between the milk of the two goat breeds, consequently in this study their milk was pooled.

* Read before the Food and Nutrition Section of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 19, 1939.

RESULTS

GENERAL COMPOSITION

In Table 1 is presented the average composition of the goat's milk and Holstein milk studied. Attention is called to the figures representing the general composition of the two milks. That these milks are so nearly alike in their content of water, lactose, fat, protein, and ash prompts one to examine carefully the make-up of their constituents in a search for differences attributable to animal species.

Proceeding in this manner we find little difference in their inorganic constituents. Like other milks they are both low in iron and copper but with probably a satisfactory content of calcium and phosphorus. Among the nitrogen fractions, however, goat's milk contains a comparatively high content of albumin and nonprotein nitrogen, surpassing both cow's and human milk in this respect. Expressing these results in percentages of the total nitrogen, however, produces larger protein values for human milk due to the small amount of casein present.

The vitamin figures represent average results expressed in International Units. Goat's milk appears to have a comparatively high potency of vitamin B_1, with values for other vitamins well within the range reported for cow's milk. In the absence of international standards for vitamin G (riboflavin), results with this vitamin are not included in the table. However, on the basis of controlled feeding trials goat's milk was found to be relatively high in the content of this vitamin. In the amounts consumed, both goat and Holstein milk failed to be adequate sources for the prevention of scurvy in guinea pigs, and subsequent work indicated only approximately 25 I.U. of ascorbic acid in goat's milk. No measurable amounts of vitamin E were found in goat's milk. Probably of equal interest to the high vitamin B_1 content of goat's milk is the fact that despite the white color of its butter fat, it contained as much

TABLE 1

Average Composition of Goat's Milk (Toggenburg and Saanen combined) and of Holstein Cow's Milk

Milk Component	Source of Milk: Goat	Source of Milk: Holstein
General Composition	*Per cent*	*Per cent*
Water	88.29	88.19
Lactose	4.55	4.59
Fat	3.5	3.4
Protein	3.10	3.17
Ash	0.79	0.70
Inorganic constituents	*Mg./100 cc.*	*Mg./100 cc.*
Calcium	114.0	106.0
Phosphorus	98.0	88.0
Iron	0.068	0.072
Copper	0.053	0.057
Nitrogen fractions *	*Gram/100 cc.*	*Gram/100 cc.*
Casein	0.3639	0.3811
Albumin	0.0679	0.0467
Globulin	0.0425	0.0443
Nonprotein	0.0419	0.0316
	International Units per 100 Grams	
Vitamins		
A (butterfat)	2,500	2,500
B_1	28	16
C	25	
D	7.4	7.9

Milk Component	Source of Milk: Goat	Source of Milk: Holstein
Fat acids in butter fat	*Per cent*	*Per cent*
Saturated (total)	70.0	63.3
Palmitic	34.4	28.5
Myristic	10.4	12.6
Stearic	7.8	12.1
Caproic	7.2	3.6
Lauric	3.9	2.3
Caproic	2.5	1.1
Butyric	2.4	2.4
Caprylic	1.4	0.7
Unsaturated (total)	30.0	36.7
Oleic	25.2	30.5
Hexadecenoic	2.7	3.3
Arachidonic	1.5	1.6
Tetradecenoic	0.4	1.1
Decenoic	0.2	0.2
Digestibility factors		
Surface tension	52 dynes	51.5 dynes
Curd tension	36 grams	52 grams
Maximum buffer index	.043	.028
Volume of fat globule	1.12 μ^3	2.25 μ^3

* Determined on fat-free basis

vitamin A as did the much more highly pigmented butter fat from Holstein cow's milk.

The figures in Table 1 representing the fat acids in the butter fat of Holstein cow's milk are well within the limits reported by other investigators. On the other hand a significant difference between goat's butter fat and cow's butter fat appears in the greater quantities of caproic, caprylic, and capric acids found in the former. These acids are the steam-volatile, water insoluble acids chiefly concerned in the Polenske numbers, and may be responsible for the odor and taste claimed by some to be characteristic of goat's milk. Certain European investigators have attributed the higher Polenske number of goat's butter fat as the cause of the observed anemia in infants fed goat's milk, a theory unconfirmed in our experiment judging by the urobilin output of several infants fed goat's milk fat.

Among the so-called digestibility factors which were measured, goat's milk shows a normal surface tension, a soft curd, small-sized fat globules and a rather high buffer index. Compared to Holstein cow's milk, curd tension values and the volume of the fat globule are considerably less in goat's milk with a higher maximum buffer index, approaching that of Jersey cow's milk.

Thus in summing up the average composition of the milk from Saanen and Toggenburg goats, one is impressed with its similarity to that of the milk from the Holstein cow. Species advantages possessed by goat's milk over cow's milk as a result of this investigation lie principally in a few constituents, such as larger amounts of albumin and non-protein nitrogen, greater quantities of vitamin $B_{(1)}$, a softer curd, and smaller-sized fat globules.

FEEDING COMPARISONS

Goat's and cow's milks were fed to goat kids and rats under controlled feeding conditions in an effort to determine the relative nutritional value of these two milks. Briefly, these results indicated little difference between the mixed milk of the Toggenburg and Saanen goats and that of the Holstein cow as a source of food for these animals. Gains in weight took place in proportion to the total energy contained in the milks, irrespective of the type of milk or its composition. This was found true of boiled milks as well as raw milks. Exclusive diets of either goat or Holstein milk were followed in time by the development of nutritional anemia in both kids and rats. It was found that this condition could be corrected or prevented by suitable iron and copper additions to the milks, and bears out the fact that both of these milks are deficient in iron, as shown in Table 1.

Results of feeding 4 babies goat's milk and 3 babies Holstein milk over a period of 12 weeks under strictly controlled conditions provided additional evidence that gain took place with either milk in direct proportion to the nutrients consumed. These babies were between 5 and 7 weeks old and averaged 7½ pounds when placed on the milk diets. An attending physician and 2 trained nurses cared for the infants during the experimental period, and the caloric intake of each infant was computed daily.

Regarding the feeding comparisons with babies it should be borne in mind that no consideration was given to the unwell infant or the child having idiosyncrasies to cow's milk. The opinion that goat's and Holstein milk do not differ in their nutritive value is based on results with healthy individuals who were otherwise normal to the extent that either goat's or Holstein milk was assimilated with equal ease.

BACTERIOLOGICAL ANALYSIS

In addition to such factors as the

composition and nutritive value of goat's milk consideration should also be given to its bacteriological properties when attempting to evaluate this milk as a source of food. The writer and his associates were able to produce goat's milk over a 27 week period which had an average daily plate count of slightly over 1,300 colonies per cc. after bottling. This raw milk was produced under normal dairying conditions, which included such procedures as proper sterilization of milking utensils, adequate cooling facilities, and the usual sanitary precautions involving both milkers and goats. Furthermore, an analysis of the milk aseptically drawn from 23 goat udders revealed that less than 40 per cent of the teats examined appeared to secrete milk containing bacteria, and then usually in comparatively small numbers. This finding would explain to a large extent the observed low count found in market goat's milk.

Goats are considered to be comparatively free from tuberculosis. Furthermore, while outbreaks of Malta fever traceable to goats have been reported in this country, the goat herd supplying the milk for the experiments herein discussed have, upon the several occasions when they were tested, reacted negatively to the presence of the *Brucella melitensis-Brucella abortus* group of microörganisms. These facts together with the evidence of a low bacterial count of the milk should not make it difficult for goat milk producers to meet the usual requirements of public health officials for the production of milk.

SUMMARY AND CONCLUSIONS

Milk from the Toggenburg and Saanen breeds of goats has been found to be a healthful, nutritious food, not unlike the milk from the Holstein breed of cows in general composition and nutritive value. The goat's milk studied had an average curd tension considered to be within the upper limits of soft curd milk, possessing values indicating a curd 31 per cent softer than that of the milk from Holstein cows. A small-sized fat globule of one-half the volume occupied by the fat globule of Holstein milk appeared as another outstanding species difference between the two milks.

The apparent ability of goats to produce milk exceptionally low in bacterial numbers operates in its favor when milks are appraised on the basis of their microbial content.

REFERENCE

1. Gamble, J. A., Ellis, N. R., and Besley, A. K. Composition and Properties of Goat's Milk as Compared with Cow's Milk. U. S. Dept. of Agriculture *Tech. Bull. No. 671*, Mar., 1939.

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FOUNDATION AND GROWTH OF PUBLIC HEALTH

IN following changes in society and advances of the science and art of preventive medicine and public health, the interesting backgrounds of these developments deserve study. Furthermore students who are preparing for careers in public health administration need to become acquainted with the pioneer contributions of public health statesmen in America and abroad, even consulting the original publications and having time to peruse them.

In this issue of the JOURNAL is reviewed a significant contribution * which will stimulate reading of the "classics in public health." The author, the first Chief Medical Officer to the Board of Education and afterward to the Ministry of Health in England, has ably described and critically evaluated the public health movement in his country. In emphasizing the importance of considering the foundations, he states that we cannot set out upon this journey in health policy without understanding the beginnings. "For the 'practical man' who builds a house without a plan we should count a fool, and no such plan is of any use which is not designed on architectural experience and with its purpose clearly in mind. Hence the approbation of history and philosophy is essential not only to actual building but to an understanding of the why and wherefore of what has gone before."

The advent of the public medical services as well as their successful administration involved the Civil Service. It is also noteworthy that with the extension of the scope of public health there was a demand for fuller coördination centrally between all the departments directly or indirectly concerned in national health. The features of an organized scheme of national health, of which a Ministry of Health is a part, "in this, or any other, democratic State," are listed as follows: (1) a central supervising department or Ministry representing Parliament; (2) local authorities or representative local bodies for discharging the duties imposed on them by Parliament; (3) voluntary societies and agencies contributing

* *The Building of a Nation's Health*, by Sir George Newman. Macmillan and Co., Limited, London, 1939. See p. 190.

of their free will assistance and aspiration, and coöperating closely with the official organization; (4) the medical practitioner, an integral and active force upon whom Parliament has imposed initial statutory duties, private and public; and (5) an educated people able and willing to practise the way of health.

Widespread improvement in nutrition during the last twenty years is recorded as due to social betterment and taste, to the commercial availability of food supplies, to increased consumption of food, and to effective public assistance for the necessitous. The provision and results of a more complete public service for relief are said to have been vindicated by the absence of widespread or serious malnutrition. Public health has likewise been a contributing factor in the larger life and opportunity which the people enjoy.

In estimating the work of the health insurance system in England, recognition is given to certain limitations. It is a practitioner service only, still without a consultative and specialist element or desirable facilities and personnel for observation, while provision for coöperation between insurance committees and sanitary authorities is reported as ineffective. But evidence indicates that "panel treatment" is improving and that the insurance system is becoming more effective and universal. "Its value will increase as it is more and more closely coördinated, if not unified, with the other public health services of the nation."

TYPHOID VACCINATION

A RENEWED interest in typhoid vaccine and typhoid vaccination will be the result of the recent publication, by Colonel J. F. Siler and his associates of the Medical Corps, U. S. Army, of their investigations carried on over several years. The work will stand as an example of the way a study should be planned and executed, regardless of the importance of the results. The investigations have resulted in marked changes in the Army typhoid vaccine. The time-honored Rawlings strain used in English speaking countries since typhoid vaccination came into vogue about 30 years ago has been replaced by a new strain, No. 58, which is regarded as of better antigenic activity. The changes in the technic of preparation and of testing need not be discussed here.

The old concept that strains of organisms of the same species are practically identical has been much revised in recent years, and the composition of the antigen is of great, perhaps of determining, importance.

It has been proved that virulence of a strain and immunizing ability run parallel to a considerable extent. Compared to the one in use previously, No. 58 is a very virulent strain. Very important is the observation that often, when immunity wanes with the passing of time, the intracutaneous administration of a small dose of the vaccine will restore protective antibodies to a high level. This of course greatly simplifies re-immunization. While the new vaccine doubtless is an improvement over the old one it is to be pointed out that the old vaccine had behind it a creditable record of usefulness covering many years as applied in military and civil life. The evidence as to the superiority of the new vaccine, though very suggestive, is practically all experimental, and it awaits an extensive field trial before a final appraisal as to the prophylactic value is to be made. Colonel Siler appreciates this, and in his summary remarks: "Decision as to the superiority in protective properties of vaccines prepared with virulent strains over those formerly used (avirulent strains) will be contingent on the results obtained

in the prevention of typhoid fever in large groups of immunized individuals. It should be possible to obtain the answer to this question within the next two or three years through observation of the occurrence of typhoid fever in the Civilian Conservation Corps."

Experience has shown that the typhoid vaccines hitherto in use have been highly successful in military practice, but under conditions of civilian application there seem to have been many examples of failure. Ordinarily it is very difficult to appraise the value of any new biologic prophylactic agent under conditions of use among a civilian population.

Probably the medical profession has expected too much of typhoid vaccination. There are instances where physicians have excluded a diagnosis of typhoid fever on the ground that the patient has been vaccinated within a year or two. This is not justified and we doubt that a history of vaccination should be given any great weight when confronted by a diagnostic problem in this field.

Two primary considerations confront the health officer in reaching a decision as to the application of any public health procedure, and this applies especially to biologic prophylactic measures. First must be considered the absolute protective value—smallpox vaccination would be rated as almost, if not quite, 100 per cent effective; influenza vaccination as of no value. The other protective inoculations stand somewhere between these extremes; typhoid vaccination in a civil population possibly stands not above the middle in any scheme of rating. The second consideration has to do with the question of whether the time, effort, and money expended on the prophylactic measure are likely to give a return commensurate with the outlay.

Applied to typhoid vaccine, it is plain that where the incidence of the disease is as low as it is in most of our cities we would not expect to undertake a program of vaccination. Bridgeport, Conn., Utica, N. Y., Fort Wayne and South Bend, Ind., and Minneapolis, Minn., had no typhoid deaths among residents in 1936, 1937, and 1938; obviously, in those places, typhoid vaccination is not to be advised. Whether to apply vaccination in a general community with a death rate even as high as that of El Paso, Tex., in 1938 (5.9 per 100,000) is a problem each health officer must decide for himself. If the prevalence of the disease is high, or there is a threat of serious exposure, as among military personnel, typhoid vaccination may be expected to give protection that will justify its adoption.

REFERENCES

1. *J.A.M.A.*, 112, 19:1941 (May 13), 1939.
2. *Mil. Surgeon*, 85, 1:23 (July), 1939.

THE SURGEON GENERAL'S LIBRARY

FOR years there has been agitation over a suitable and fireproof building to house what is generally known as the Surgeon General's Library. We have called attention to this,[1] giving in full also the resolutions passed by the Medical Library Association,[2] urging sufficient funds to sustain this great work.

It is heartening to note that President Roosevelt has recommended the acquisition of a site for a new Army Medical Library and Museum building in Washington in his budget for 1941, which was submitted to Congress on January 4 of this year. In this budget $600,000 is recommended for the purchase of a site and preliminary expenses in connection with the building. The site of

selection is on East Capitol Street adjacent to the Congressional Library group. The budget which contains this item is now before the Committee on Appropriations of the House of Representatives.

It will be recalled that the 75th Congress authorized such a building at a cost of $3,750,000 but failed to make an appropriation for the purpose, consequently their action was without effect.

We have in Washington the greatest medical library in the world, but its housing is very deficient. While the term "medical" is used, it must be remembered that this library contains full files of books and journals on public health, and it is just as essential to public health workers as it is to the medical profession in general. Our Association is just as much interested in it as is the American Medical Association, for example.

REFERENCES

1. *A.J.P.H.*, 26:930 (Sept.), 1936; *Ibid.*, 26:1219 (Dec.), 1936; *Ibid.*, 29:271 (Mar.), 1939.
2. *Bull.*, Medical Library Assn., 25, 1 (Sept.), 1936.

Supplement to March Journal

Diphtheria Carrier Survey

made by the
Diphtheria Immunization Study Group
of the

Sub-Committee on Evaluation of Administrative Practices
of the
Committee on Administrative Practice

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BOOKS AND REPORTS

The Building of a Nation's Health —*By Sir George Newman. London: Macmillan,* 1939. 479 pp. Price, $6.00.

" How statecraft and medical knowledge took counsel together " at the opening of a new epoch of preventive medicine is the theme of this stimulating record of growth of the complicated machinery which controls national health, of the reasons for the shape it has taken, and of the leaders in the developments in Great Britain. The book is divided into 14 chapters, the first of which describes the foundations of modern public health. Then follow chapters dealing with medical education, the creation of the Ministry of Health, functions of local government, various features of public health and preventive medicine, measurement and a look forward, with a concluding account of the part played in the movement for a quarter of a century by Sir Robert Morant.

The author considers the laying of the foundations of the modern English system of a public health service in three periods: the pioneering state from 1832 to 1888; the Local Government Board regimé from 1869 to 1900; and the modern period from 1900 to 1939. Commenting upon the changes in this generation, " even more profound than those which altered the social history between 1832 and 1890," the author states that " ' the centre of gravity ' of public health governance has moved from the importance and effect upon mankind of a sanitary environment to the uncharted liabilities and obligations inborn in the nature of man's body itself. The wisdom of the body and its physiological law has been unveiled in our own time and has thrown new light upon its health and disease, changing both the approach to and the purpose of preventive medicine."

The principal milestones in the English national health system, " building itself step by step, growing up by necessity rather than superimposed by law," are listed in the following order of events: sanitation, hospitals, isolation, public water supply, industrial health, notification of infectious diseases, registration of causes of death, vaccination (as the first form in England of communal immunity), the control of a wholesome food and milk supply, housing reform, the public medical services (including public assistance and medical treatment). The significant public services of Edwin Chadwick and of Sir John Simon, and the effects of the Public Health Act of 1848 creating the General Board of Health (expressing for the first time the conviction of Parliament that the State is directly responsible for the health of the whole people) are discussed in a manner to emphasize the importance of a central health authority with a medical department and with proper freedom of local government. William Farr's work as medical statistician

> . . . led directly to the converging point of action and to the elucidation of the cause of excessive mortality. The annual decennial volumes issued by the Registrar-General summarizing and classifying all the death certificates may look dull, dry, and meaningless to the uninitiated reader, but they are the " Domesday Book " of the modern age, the vital returns of a people, the real life budget and mirror of their physical condition. A national health system not established on such data but on some temporary salvage or emergency endeavor is unreliable, empirical, ephemeral and possibly capricious.

Referring to the profound and arrest-

ing effect of the cholera invasions, the Poor Law reform, Chadwick's revolutionary report, the Towns Commission, and the history of the Board of Health, the author reminds us—

> that in practical politics lasting results are not accomplished by the operation of single forces or issues, but only by converging energies and the trend of political opinion. Here a little, there a little, here one means, there another, and progress happens.

And recalling the acceptance of the ideas of vaccination, anesthesia, antiseptic surgery, and the causation of infective disease,

> when the people understand science, and when they receive the succour which it brings, their answer is as clear as daylight.

After pointing out that an essential feature of a national health system is the existence and competence of the medical profession, the creation by Linacre of the Royal College of Physicians and the important rôle of the General Medical Council are described, followed by an account of the development of a new spirit in medical education. While a program for the postgraduate instruction of medical practitioners was formulated by the Athlone Committee of 1921, the project was given impetus by the establishment of the London School of Hygiene and Tropical Medicine.

> Out of postgraduate study in the past has come nearly every great advance in medicine. What is novel today is the new knowledge combined with the insistent claims of the new world—social, economic, communal. For both these circumstances give new direction to public medical needs—nutrition, immunisation, health education, physiological assessment, physical welfare, insurance. Postgraduate study will obviously include all that pertains to the science and art of medicine, and the cultivation of the health and capacity of the normal man.

Cultural study should also include other subjects listed, as for instance: the history of medicine, social science, the genesis and history of the public medical services, and the great medical biographies.

Space does not permit of a detailed review of chapters rich in history and basic information dealing with the work of the Ministry of Health and of local authorities, or with programs in school health including special classes and schools, in physical education and recreation, in maternal and child health, in nutrition, in industrial hygiene, and in health insurance and medical research. For the future, the author effectively stresses the need for better application of knowledge by the State and its wider usage by the people. This valuable contribution by an outstanding public health statesman should be made available not only to public health administrators but to every student of public health.

IRA V. HISCOCK

The Patient as a Person: A Study of the Social Aspects of Illness—*By G. Canby Robinson, M.D., LL.D., Sc.D. New York: Commonwealth Fund,* 1939. 423 pp. Price, $3.00.

The history of hospitals may be divided into four periods. During the first, which extended through the Middle Ages, the primitive hospital or hospice was merely a benevolent home for the sick where they might rest until they recovered or died. During the second, the beginning of which might be credited to the Renaissance, surgical and medical therapy, and later laboratory services were introduced to facilitate recovery. The third period began with the introduction of trained nursing service. The last or modern represents the most significant development in our changing conception of the functions of a hospital. This development is founded upon the increasing realization that illness is largely conditioned by environmental and social factors, and that the care of the sick in hospitals is incomplete unless it includes a serious

effort to discover and to correct these important determining influences.

Because of the increasing complexity of the scientific services, hospital physicians have been able to concern themselves very little with the development of the nursing services and often not at all with the newer social service activities of the modern hospital. These important responsibilities have therefore been relegated to a specialized non-medical staff of social workers, who function almost independently on the outskirts of the clinical services of the hospital and the outpatient clinic.

The volume is interestingly written around 174 case histories, most of which portray the sorrows and tragedies of the poor. In simple language and without any attempt at moralizing, the 174 case histories paint a composite picture of American life among the underprivileged, yet this is apart from the primary purpose of the report, which effectively reveals what Minot and others have called "the social components of medicine."

It is apparent that Dr. Robinson's interest in this subject was primarily stimulated by the growing influence of modern psychiatry on medicine. Some of us have always believed that two major influences were responsible for recasting the functional responsibilities of the hospital into the modern mold, the growth of psychiatry, and the rapidly enlarging field of preventive medicine, of which mental hygiene is a part.

Members of the American Public Health Association will find the last chapter on "the Treatment of the Patient as a Whole" especially interesting. Here Dr. Robinson describes his recommendations for focusing the attention of physicians on this important aspect of the care of the sick. The evangelical work is begun in the third year of the medical school, each student being assigned to study at least one patient as a total individual, and to present a report at one of the informal weekly conferences attended by 25 students assigned at that time to the medical outpatient clinic. It will interest public health workers to learn that the conferences are also attended by the public health administrators of the Eastern Health District of Baltimore, by visitors from the Baltimore department of health, and from the Johns Hopkins School of Hygiene and Public Health, as well as by a psychiatrist, medical social workers, and representatives of outside social agencies. The opportunity to see the patient in his home environment, enables the student to consider the case as a human as well as a medical problem. Aside from observing the relationship of the various social agencies to medical care, "the method of teaching serves to introduce the student to phases of hygiene and public health as related to clinical medicine and to demonstrate the integration of medical practice and public health." It is especially valuable that this opportunity should come at the very beginning of clinical training so as to leave a vivid and permanent impression upon the mind of the student which may be carried into the work of the fourth year and of the interneship and, it is to be hoped, on into the private practice of medicine or hospital work. As Dr. Robinson states, "If the family physician can be adequately trained and satisfactorily established, he will form the first line of attack in the battle of mental hygiene, preventive medicine, and public health."

Dr. Robinson realizes the futility of expecting the sustained interest of busy hospital clinicians in the daily routine revelations of the medical social workers. They are the fact finders but they require medical leadership which they usually fail to receive. In accordance with the plan evolved by Dr. René

Sand at the University of Brussels, Dr. Robinson advocates the establishment at hospitals of a special department covering the social aspects of illness, which should operate beside the clinical departments in coöperation with all their directors and chiefs.

Two quotations give the keynote on which the volume ends, and with the author's cautious views concerning the future trends in medical practice:

> "There are traditions and patterns in medical service, fostered by the medical profession throughout its long history, which must as far as possible be retained, for they are based upon enduring human characteristics." "The temperament and personal characteristics of both doctor and patient are significant, if the relationship is to be intimate and personal, and provision for free choice and easily affected changes must be preserved."

The Commonwealth Fund deserves commendation for its support of this work. If it will be widely read by hospital physicians, medical school faculties, public health administrators, and above all by general practitioners, it will enlarge the social vision of medical men by reminding them that care of the sick cannot be divorced from the general problems of the world we live in.

GEORGE BAEHR

Pneumonia: With Special Reference to Pneumococcus Lobar Pneumonia—*By Roderick Heffron. New York: Commonwealth Fund,* 1939. 1086 pp. Price, $4.50.

This volume completes the trilogy which has resulted from the Massachusetts Pneumonia Study and Service inaugurated by Dr. George H. Bigelow. These are *Lobar Pneumonia and Serum Therapy* (called in its revised edition, *Pneumonia and Serum Therapy*) by Lord and Heffron, the *Biology of Pneumococcus,* by Benjamin White in collaboration with Robinson and Barnes, and the present volume. Supported and published by the Commonwealth Fund, each of these contributions to our knowledge of pneumonia is complete in itself—so complete, in fact, as to constitute practically exhaustive repositories of knowledge in its field up to the date of publication.

This volume discusses the disease, pneumonia, with special reference to pneumococcus lobar pneumonia, and is therefore a practical reference handbook for the epidemiologist and the clinician. That it may be complete, chapters are devoted to the causative organisms of pneumonia (including those forms not due to pneumococci) and to the pathogenesis and the pathology of lobar pneumonia; a chapter is also devoted to experimental pneumococcus infections. Diagnosis and serum therapy treatment are thoroughly discussed—but not to the neglect of the newer chemotherapeutic agents. Review of the observations that have been made upon the use of sulfanilamide and of sulfapyridine seem to have been included up to the minute of going to press.

One of the most attractive chapters, especially from the standpoint of the investigator and the teacher, is called "Continuing Problems." The special interest of public health administrators will be drawn to the section of this chapter which concerns pneumonia programs; this outline is based upon the author's broad experience in Massachusetts.

In an appendix is given information relating to the Massachusetts Pneumonia Study and its continuing program. This was begun in 1931 and it is still receiving the active support of the state.

The book is attractively made and excellently printed. The diction is clear and direct; it is the style of a trained and interested investigator thoroughly equipped to select and synthesize pertinent information from all sources. There are a bibliography of 1471 references and an index of 61 pages.

A. P. HITCHENS

Tuberculosis and Social Conditions in England: With Special Reference to Young Adults—*By P. D'Arcy Hart and G. Payling Wright. London: National Association for the Prevention of Tuberculosis,* 1939. 165 pp. Price, $1.00.

Respiratory tuberculosis mortality among young adults, both in England and the United States, has failed to decline as rapidly as has the tuberculosis death rate for other ages. This publication reports an interesting study into the reasons for this condition in England with special investigations in the London area. The set-back to a formerly satisfactory decline has been particularly evident among young women, whose pulmonary tuberculosis death rate, per 100,000, fell from 276 to 112 in the 30 years between 1871–1880 and 1901–1903, but showed practically no further decline during the next 30 years, being 107 in the period 1911–1913 and in the period 1931–1933. Nearly half the deaths from all diseases among young women, aged 15 to 24, are due to pulmonary tuberculosis.

In their search for causative factors, the authors have investigated the standard of living, employment, local poverty, housing, nutrition, and the migration occurring from one part of the country to another. For the country as a whole a correspondence is demonstrated between average real earnings of the working class and pulmonary tuberculosis mortality during the past 90 years. This relationship is closer for young adults than for any other age. The authors believe the retardation in the decline of the pulmonary tuberculosis death rate among young adults is due in part to the contemporaneous slowing in the improvement of the national standard of living and to the special sensitiveness of young people to unfavorable social conditions.

Two further social changes are thought to have been influential. One of these is the rather prolonged check to the reduction of overcrowding. The percentage of persons living more than two to a room was actually greater in 1921 than in 1901 or 1911. Since that time housing has been improved. The other social change is the marked rise in the employment of young women, particularly in industrial occupations with the accompanying strain and fatigue, and the increased number of contacts.

The failure of the tuberculosis death rate of young adults to decline has been more noticeable in the large urban areas than in the rural districts, and most noticeable in those boroughs with severe poverty and inadequate housing.

C. E. TURNER

Your Experiment in Living—*By Michael Ardagh Cassidy, M.D., and Helen Gay Pratt. New York: Reynal & Hitchcock,* 1939. 153 pp. Price, $1.75.

This book is described by the authors as a "friendly talk" and was designed originally for a certain adolescent. It is intended as a basis for discussion between parent and child rather than as a textbook for general use. The authors call attention to the fact that many excellent books for younger adolescents have been written but believe that this is the first time that the matters contained in this volume have been discussed for the later adolescent with the more nearly mature mind. It is their opinion that at this period mind and body do not keep pace with each other and their purpose is to give to these young people an understanding of the changes which are taking place so that the passage into full maturity may be as painless as possible.

The book assumes that the readers will have received some instruction in physiology and will have picked up a

lot of "heterogenous information unrelated and perhaps unreliable."

The object of the book as set out by the authors appears to have been adequately fulfilled. The great point is that they give here in clear and simple language facts about which there is always curiosity on the part of both boys and girls and which perhaps more often than not are discussed carelessly, inadequately, and even in a vulgar manner by persons not qualified to speak. The little volume can be recommended as among the best of its type. MAZŸCK P. RAVENEL

Medical Microbiology—*By Kenneth L. Burdon, Ph.B., Sc.M., Ph.D. New York: Macmillan,* 1939. 763 pp. Price, $4.50.

The present work on microbiology is the outgrowth of an earlier book by the same author which was intended primarily for nurses, and even in the volume under review there remains evidence of the emphasis on the rôle of the nurse in the care of the sick and in the prevention of sickness. However, it is admirably adapted for those who require a much more extensive acquaintance with the subject, chiefly medical students and physicians.

Part I is devoted to the fundamentals of microbiology; Part II largely to methods; Part III is entitled "Infections and Resistance," but it embraces much more than these terms imply; Part IV deals with groups of infections and with individual diseases considered chiefly in relation to the regions of the body primarily involved. The Appendix covers approximately 70 pages of detailed matter (methods and tests) which is better presented in this form than it would be in the text proper.

Although the author makes acknowledgment of some aid received from professional colleagues, the whole book is essentially his own work; there are no sections or chapters written by others. The subjects are in general excellently covered and the book is second to none in the field. The sections dealing with the applied aspects of bacteriology are concise and accurate and especially sound from the point of view of preventive medicine; for example, the discussion of the control of diphtheria (p. 481) could scarcely be improved. The portions of the article on tuberculosis which deal with prevention are brief but adequate.

When we turn to the section on anaphylaxis and hypersensitiveness (p. 417) it is most refreshing to find that the author carefully distinguishes between the reactions in man and those in animals, and emphasizes the fact, so often overlooked, that in man the first injection of a foreign protein may lead to a severe anaphylactic reaction.

As examples of incorporation in the text of recent advances one turns to typhoid vaccine (p. 562) and finds mention of the newer antigen (Army No. 58); to encephalitis and finds human encephalitis mentioned in relation to encephalomyelitis in horses (p. 626); to yellow fever and finds jungle yellow fever (p. 629) concisely discussed; to coccidioidal granuloma (p. 639) and finds reference to the respiratory type of the disease and the relation of the infection to certain erythema nodosum-like lesions. These and similar instances are evidence that the author has embodied the latest useful information available at the time the book went to press.

There are a few defects and omissions: Description of the test for sterility of a bacterial vaccine (p. 406) is inadequate; a negative culture result with one loopful of the vaccine is not nearly sufficient to establish sterility.

Under "Complications" (p. 623) of prophylactic vaccination against rabies the author fails to mention "Treatment Paralysis"; no mention is made of occasional infections of tetanus and en-

cephalitis that may follow smallpox vaccination. The intraspinal use of tetanus antitoxin is advocated, though this method is in less favor than it was earlier.

This leads one to say that although the author is not a clinician the clinical suggestions and recommendations throughout are usually well founded. One sums up an estimate of the book by saying that it should be valuable for teachers and students of bacteriology when the subject is considered from the point of view of human pathology.

GEORGE W. McCOY

Principles of Medical Statistics—*By A. Bradford Hill (2nd ed.). London: Lancet,* 1939. 189 pp. Price, $2.25.

This is an excellent book on elementary statistics. The principal change in this edition is the inclusion of a chapter on the usual methods of calculating standardized death rates. Although originally written for the physician, it provides for the public health worker a good introduction to the field of medical statistics.

There are 18 chapters, and among the subjects treated are selection, presentation, variability, standard deviation, averages, sampling including a discussion of chi square, correlation and life tables. One of the interesting features of the book is the three chapters devoted to common fallacies and difficulties, which are full of practical advice. Included in the appendix are three pages of definitions and formulae and a two page table of chi square.

The first edition, originally drafted at the invitation of the editors of the *London Lancet* was intended to acquaint the physician with an elementary statistical technic. It appeared serially in that publication and the acclaim that followed prompted the editors to issue the articles in book form.

LOUIS FELDMAN

Economical Administration of Health Insurance Benefits: Studies and Reports, Series M (Social Insurance), No. 15—*Geneva and Washington: International Labour Office,* 1938. 332 pp. Price, $1.75.

This timely publication deals systematically with problems of great importance for social insurance and for public health agencies. It is divided into three parts: (1) the principle of economy in administration of health benefits, (2) the principle of economy in national laws and regulations, and (3) documents of an international character. A useful bibliography is included.

In part one, of special interest to health administrators, are considered the principles of economy and its general application in sickness insurance funds, the work of health insurance fund physicians, application to therapeutics, and the preventive aspect of the problem. Consideration is given to institutional treatment and the assessment of disability, and to the preventive possibilities open to the physician, especially in guarding against and treating chronic tuberculosis. Examples are drawn from daily medical practice.

IRA V. HISCOCK

Textbook of Healthful Living—*By Harold S. Diehl (2nd ed.). New York: McGraw-Hill,* 1939. 634 pp. Price, $2.50.

Dr. Diehl has thoroughly revised and enlarged his first edition of *Healthful Living,* and has added timely chapters on "Modern Parenthood," "Community Health" and "Organized Health Work." The volume has been recast into a convenient form for textbook use with discussion suggestions and references at the end of each chapter. The book has preserved its lucid style and helpful divisions of subject matter. The appendix consists of tables of standard weights, nutritional values

of various foods, report of the Sub-Committee on Communicable Disease Control of the American Public Health Association, and a Personal Health Record form. This book can be recommended highly, not only as a college text but also as interesting and helpful reading for the general public.

RICHARD A. BOLT

Committee on Nutrition in the Colonial Empire. *First Report—Part I. Nutrition in the Colonial Empire. Part II. Summary of Information Regarding Nutrition in the Colonial Empire. London: His Majesty's Stationery Office,* 1939. 210 pp. and 145 pp. Price, $.90 and $.75, respectively.

The committee points out the difficulties encountered owing to the fact that there are 48 different territories with a total population of more than 55 million divided into countless groups with different food habits and customs. For the same reason it is difficult to summarize such a report. The outstanding features are: (1) that the problem of proper nutrition is of great importance to the British Empire, involving as it does, general administration, particularly in regard to agriculture, public health work, and the maintenance of virile populations; (2) that throughout the greater part of the Colonial Empire there is a low standard of living in which ignorance is an important factor; (3) that malnutrition is one of the chief causes of the excessive infant mortality in most Colonial territories; (4) that the single most striking feature is the almost complete absence of milk and animal products from most tropical diets.

Like most English reports, this is well done. The section on the principles of correct nutrition is a textbook in itself. Of great interest are the 6 appendices. Among these, that on rice attracts attention, since it constitutes the staple food of nearly one-half the world's population. Rice, as eaten usually, is not a complete diet and leads to various nutritional deficiencies, the best known of which is beriberi. Several processes have been devised which to some extent prevent this, among which are the "josh" method of India and "parboiling." In the latter the rice is soaked sometimes as long as 4 days, and then steamed for from 10–20 minutes. During soaking and steaming vitamin B_1 diffuses into the endosperm, and in the subsequent milling some of this is retained, though a considerable amount is lost in the water. Beriberi has been seen in communities existing on parboiled rice, but it is a step in the right direction, and shorter soaking apparently avoids the excessive loss of B_1.

In Part II the many areas are considered one by one, with population, birth and death rates, infant mortality, diets, prevalent deficiency diseases, etc.

This is a valuable and interesting report.

MAZŸCK P. RAVENEL

Epidemic Encephalitis: Etiology, Epidemiology, Treatment. *Third Report by the Matheson Commission. New York: Columbia University Press,* 1939. 493 pp. Price, $3.00.

This is not a mere review of published material on the ever broadening subject of epidemic encephalitis, but rather a comprehensive treatment of a sequence of discoveries in the field and in the laboratory, tied in with an impartial evaluation of clinical applications of such discoveries. The Matheson Commission has spared no effort in linking the available evidence and making it a readable and exhaustive work on this important subject.

The list of references (number 3,532) is complete from 1930 through the first half of 1937 and includes the more important articles for the first half of 1938. With the two previous reports of the Matheson Commission, 1929 and

1932, respectively, the subject of epidemic encephalitis has been brought up to date as completely as was possible. The reader may be spared hours by consulting this report with its valuable list of references, instead of hunting through library catalogues, stacks, references lists, and indexes.

The text is well supplemented with charts, tables, and graphs. The bibliography, arranged in alphabetical order by name of author, occupies 314 pages.

Any person interested in epidemic encephalitis should make frequent use of this compact volume; those concerned with didactic instruction on the subject of encephalitis will find it equally valuable when discussing either etiology, epidemiology, or treatment.

LEONID S. SNEGIREFF

The Endocrine Glands—*By Max A. Goldzieher, M.D. New York: Appleton-Century,* 1939. 916 pp. Price, $10.00.

The first part of this text of 916 pages of fine print is given over to a consideration of the subject in general, with a brief, yet sufficiently complete discussion of the anatomic and constitutional factors, allied with the underlying principles of endocrine functions.

The remainder of the book is divided into parts dealing with individual gland structures. Each part includes a brief chapter on detailed discussion of the clinical entities. Clinical reports are included, but are well summarized and not too numerous. Illustrations of tissue sections and of the various clinical syndromes are quite good.

The chapter on the Adrenals is deserving of particular mention, for here the author crystallizes his clinical-pathological observations that have extended over many years. Tissue illustrations in this chapter are outstanding.

It is almost impossible for a reviewer to avoid taking exception to some of the clinical interpretations and therapeutic recommendations in a book on endocrinology. The diagnostic criteria set forth by the author for the diagnosis of various pituitary disorders will hardly have universal approval. Furthermore, the author's enthusiasm for oral therapy in pituitary dysfunctions is a point that may be challenged. Apparently this criticism has been met before, and the author makes no apology for his attitude, for in the preface, he writes that he "does not share the nihilistic attitude concerning therapy which seems to rule today . . ."

Such criticisms are minor and are far overshadowed by the information contained in this book. It is a definite contribution to clinical medicine, and serves as a good practical text on the subject.

The make-up and printing of the book are good, and some of the illustrations especially so.

DANIEL L. SEXTON

History of the London County Council, 1889–1939—*By Sir Gwilym Gibbon and Reginald W. Bell. London: Macmillan,* 1939. 696 pp. Price, $7.00.

Here is a storehouse of information for the student of history, public health, and social science wherever he may reside. Beginning with a lively description of London Government before 1889 (including much on sanitation and medical care) and of the reform movement, consideration is then given to the introduction of the party system and policies, to organization, procedure, finance, staff, and supplies. A detailed analysis of the Council's services embraces education, public health, medical, hospital and mental health services, housing, public health assistance, flood prevention, street improvements, public buildings, public safety, and parks. Regulative services are discussed in terms of control of land development and building, public control and administration of justice. The

concluding section deals with the Council's external relations, including those with Parliament, with other local authorities, with the public utility undertakings, and with the public. Data are given in the appendices on population, county electorate, party representation, and expenditures.

Reviewing only some of the public health features, although the entire book should be read to obtain a background of the philosophy and relationships, we find recorded in some detail the Public Health (London) Act of 1891 which was the "foundation from which sprang an organization which was to run side by side with, and indeed finally to absorb, the poor law medical service, becoming ultimately perhaps the largest health service in the world." The twelve main functions of a sanitary authority of the Act included: (1) detection and abatement of nuisances, (2) maintenance of local drainage system, (3) removal of refuse, (4) and (5) insurance of water-closets and water supply, (6–8) inspection of food, control of dairies, and offensive trades, (9–10) notification and control of infectious and epidemic diseases, (11) provision of hospitals and ambulances, (12) control of tents and vans when used as places of habitation, and to regulate use of underground rooms. These provisions are based on the code of which the provinces had been enjoying the benefit for the past 16 years, the Public Health Act, 1875. From a small nucleus in 1891 of a medical officer of health and one medical assistant, 6 inspectors, a statistical clerk, and 6 other clerks, the present department, including institutional employees, numbers over 23,000.

In these days, when the preference for carrying out public work by the direct operation of official bodies is so marked, it is worth while pausing to observe the maternity and child welfare service as an example of how an important and influential organism can come into being by voluntary effort alone, when encouraged, aided, and supervised by enlightened public authorities.

Following the success of voluntary maternity and child welfare centers, in combination with day nurseries, government recognition was given with direct grants at first by the Board of Education and later by the Local Government Board. It was made a condition of grant that their work should be coördinated with the health visiting and clinical services of local authorities. In 1929 the direct grants from the exchequer to the voluntary centers were discontinued, and in London a scheme was devised under which the Council is required to pay some 30,000 pounds a year in grants to maternity hospitals, mother or baby homes, and domiciliary midwifery; and the borough councils to pay grants for infant welfare centers, day nurseries, and homes for sick babies.

Progress in food and milk control, school medical service, control of tuberculosis, of venereal diseases, and care of the blind in addition to hospital and medical care is discussed. For the future develpoment of general hospitals the Council embarked on a planning and development survey, a term which it interpreted as covering "all questions relating to the design, erection, enlargement, alteration, structural equipment, and general maintenance of hospitals and other property under the management of the Central Public Health Committee." It is stated that hospitals for the chronically sick have been so well developed that the mixture of sick with healthy in institutions is practically a thing of the past, and that since April, 1938, all the Council's hospitals—acute, chronic, and special—have been administered under its public health powers. Experience in postgraduate medical education is also related, together with the developments in domiciliary medical service. Space does not permit of a deserved

review of the story of stupendous achievements in housing, of developments in the study and care of mental disease, and in welfare. These chapters must be read to be appreciated.

The authors have described in an interesting and enlightening manner the organization, relationships, services, and significant achievements of this great organization which has exercised such an important influence on the lives of the people of London, and stimulated the development of constructive governmental activities elsewhere. The book is well printed and effectively illustrated. The text is enlivened by topical cartoons from *Punch*. There is a useful index. IRA V. HISCOCK

BOOKS RECEIVED

SCHOOL HEALTH PROBLEMS. By Laurence B. Chenoweth, Theodore K. Selkirk, with a chapter on School Health Administration by Richard Arthur Bolt. 2d ed. New York: F. S. Crofts, 1940. 419 pp. Price, $3.00.

WAYS TO COMMUNITY HEALTH EDUCATION. By Ira V. Hiscock. New York: Commonwealth, 1939. 306 pp. Price, $3.00.

MANUAL OF PUBLIC HEALTH NURSING. Prepared by National Organization of Public Health Nursing. New York: Macmillan, 1939. 529 pp. Price, $2.50.

MINERAL METABOLISM. By Alfred T. Shohl. New York: Reinhold, 1939. 384 pp. Price, $5.00.

INDUSTRIAL HYGIENE. Edited by A. J. Lanza and Jacob A. Goldberg. New York: Oxford, 1939. 743 pp. Price, $8.50.

PUBLIC HEALTH DENTISTRY AND HEALTH SECURITY. A TEXT-WORKBOOK FOR STUDENTS AND PRACTITIONERS. By Alfred J. Asgis. New York: Clinical Press, 1939. Price, $3.50.

A TEXT-BOOK OF GYNAECOLOGY FOR STUDENTS AND PRACTITIONERS. By James Young. 5th ed. New York: Macmillan. 425 pp. Price, $5.00.

PRINCIPLES OF PSYCHIATRIC NURSING. By Madelene Elliott Ingram. Philadelphia: Saunders, 1939. 428 pp. Price, $2.75.

MEDICAL CARE (A SYMPOSIUM). LAW AND CONTEMPORARY PROBLEMS. Vol. VI, No. 4, Autumn, 1939. Duke University Law School, Durham, N. C. 186 pp. Price, $.75.

VITAMIN D. CHEMISTRY, PHYSIOLOGY, PHARMACOLOGY, PATHOLOGY, EXPERIMENTAL AND CLINICAL INVESTIGATIONS. By C. I. Reed, H. C. Struck and I. E. Steck. Chicago: University of Chicago Press, 1939. 389 pp. Price, $4.50.

UNTO THE FOURTH GENERATION. GONORRHEA AND SYPHILIS—WHAT THE LAYMAN SHOULD KNOW. By Irving Simons. New York: Dutton. 1940. 243 pp. Price, $2.50.

ANNUAL REPORT OF THE PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA FOR 1937. Volume I. With Appendices. New York: British Library of Information, 1939. 345 pp. Price, $1.75.

ACCEPTED FOODS AND THEIR NUTRITIONAL SIGNIFICANCE. By Council on Foods of the American Medical Association. Chicago: American Medical Association, 1939. 492 pp. Price, $2.00.

MEDICOLEGAL AND INDUSTRIAL TOXICOLOGY—CRIMINAL INVESTIGATION — OCCUPATIONAL DISEASES. By Henry J. Eilmann. Philadelphia: Blakiston, 1940. 324 pp. Price, $3.00.

TÜRK HIFZISSIHHA VE TECRÜBÎ BIYOLOJI MECMUASI (TÜRKISCHE ZEITSCHRIFT FÜR HYGIENE UND EXPERIMENTELLE BIOLOGIE). In Turkish and German. Istanbul, Turkey. Vol. 1, No. 1, October, 1938. Vol. 1, No. 2, April, 1939.

A SURVEY OF HOSPITAL SERVICES AND FINANCES IN THE PHILADELPHIA AREA. Philadelphia: The Community Fund of Philadelphia and Vicinity, 1939. 96 pp. Price, $1.00.

CITRUS FRUITS AND HEALTH. Lakeland, Fla.: Florida Citrus Commission (Scientific Advisory Board), 1940. 73 pp.

A SURVEY OF MOUTH HYGIENE PROGRAMS FOR SCHOOL CHILDREN—5 vols.

Section I: "Thirteen Largest Cities in the United States (38)"

Section II: "Cities of 150,000 to 500,000 Population (42)"

Section III: "Cities of 100,000 to 150,000 Population (42)"

Section IV: "Cities of 50,000 to 100,000 Population (97)"

Section V: "Cities of 25,000 to 50,000 Population (179)"

Cleveland: Cleveland Child Health Association, 1939. Price, $.75 per Section.

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

Is It Fashionable Figures or Healthier Bodies? — Statistical evidence is offered to the effect that our womenfolk don't weigh as much as they used to. Health education, Hollywood fashions, changes in the American dietary, demands of work, recreational trends, all may have played a part in the change, so you are free to hold to your pet notions about the cause.

ANON. American Women Getting Thinner. Stat. Bull. (Metropolitan Life Insurance Company) 20, 11:1 (Nov.), 1939.

Health and Industry — Eleven papers on industrial hygiene — from as many different angles—will be of interest to health officials whose work has any bearing upon this field. It is neither possible, nor necessary, to try to give a resumé of all that will be found in this useful collection.

BAUDOUIN, J. A. Industrial Hygiene from the Public Health Aspect (and ten related papers). Canad. Pub. Health J. 30, 11:517 (Nov.), 1939.

Good Maternal Hygiene—A practising physician and a state department nursing consultant give first hand accounts of a rural county maternal health program which has all the earmarks of success.

BOICE, C. A. Providing Continuity of Maternal Care, (and) HARTZ, A. E. Home Delivery Service in an Iowa County. Pub. Health Nurs. 31, 12:689 (Dec.), 1939.

First Comes Food—Do you wish a more stable society, less economic loss through needless sickness and deaths, a reduced cost of poor relief, a better chance for underprivileged children, a real equality of opportunity? Then see that every man, woman, and child gets an adequate diet. That is the rock bottom base for all social betterment.

BOUDREAU, F. G. International and National Aspects of the Campaign for Better Nutrition. J. Am. Dietet. A. 15, 10:885 (Dec.), 1939.

"Three R's" and an "H"— Health education is more than establishing health habits like love of the toothbrush and hatred for gin. Health education means understanding the human body. What the health educator should know is hinted at in this appallingly long list of basic sciences. An invigorating paper.

CARLSON, A. J. The Rôle of the Fundamental Sciences in Medical Progress. Sci. Month. 50, 1:59 (Jan.), 1940.

Here's an Idea to Speculate Upon —It has been observed that dental caries is reduced in incidence in those communities in which the drinking water contains enough fluorides to cause mottled tooth enamel. This paper discusses the possibility of adding fluorides to water supplies in quantities sufficient to influence caries but not enough to cause mottling!

COX, G. J. New Knowledge of Fluorine in Relation to Dental Caries. J. Am. Water Works Assn. 31, 11:1926 (Nov.), 1939.

After Sixty Years—Only when a health department has isolated all known open cases, when all active but

not open cases are under medical care, when a high proportion of household contacts undergo x-ray examination, and when a system of financial subsidy for needy cases is established—only then should collateral tuberculosis prevention activities be attempted, concludes this provocative paper. We seem at last to have reached the brass tacks stage of tuberculosis control. This is one of five papers constituting a symposium on Mass Tuberculin Testing and X-raying, all well worth study.

DOULL, J. A. The Tuberculin Test in the Control of Tuberculosis. Am. Rev. Tuberc. 4, 6:634 (Dec.), 1939.

A State Advances against Cancer—What New York State proposes to do for the control of cancer under its new law. Reporting, tumor-finding clinics, cancer institutes and continued research are the means to be utilized.

GODFREY, E. S., JR. New York State Program for Cancer Control. New York State J. Med. 39, 24:2280 (Dec. 15), 1939.

About Diphtheria—We thought—or hoped—that we had annotated our last paper on diphtheria prophylaxis, but here is a good one for the record. When to immunize first, when to Schick test, how many doses of toxoid to give, all are ably commented upon.

HILLMAN, M. M., and LINDE, J. I. Some Problems of Diphtheria Immunizations. J. Pediat. 15, 4:513 (Oct.), 1939.

When Tuberculin Tests May Be Hazardous—Cases are reported in which recent and unstabilized tuberculous lesions reacted unfavorably after the injection of tuberculin in the Mantoux test. This raises the question whether the injection of more than 0.01 mg. is wise, also whether it is safe to repeat positive tests. With known contacts roentgenography should precede skin tests.

LINCOLN, E. M., and GRETHMANN, W. The Potential Dangers of Tuberculin Tests. J. Pediat. 15, 5:682 (Nov.), 1939.

S.P.C.S.—Health workers will be interested in the suggestion that a new bismuth product called Sobisminol appears to be as effective in the treatment of syphilis when given by mouth as are other bismuth salts when given by injection. If these findings are confirmed by extended experience, syphilis sufferers are going to be spared a great many jabs in the buttocks.

MEININGER, W. M., and BARNETT, C. W. The Treatment of Syphilis with Sobisminol Mass Given by Mouth, (and) SCHOLTZ, J. R., *et al.* Sobisminol Mass: Clinical Results with Oral Administration. J.A.M.A. 113, 25:2214 (Dec. 16), 1939.

Cancer Mortality by Regions—Here are presented geographic variations in the occurrence of cancer of the various organs. With age adjustments, New York and Rhode Island have rates twice as high as Arkansas and New Mexico. Differences in the incidences of the various types of lesions suggest that contributory factors may be found in the environment.

MOUNTIN, J. W., and DORN, H. F. Some Peculiarities in the Geography of Cancer. J.A.M.A. 113, 27:2405 (Dec. 30), 1939.

Health Unit Services—What personal services may a county health unit staff be expected to render to the run-of-the-mine residents of the county? Three typical departments were studied. About a quarter of the entire population was reached in one year. School children got most services, then infants, then preschool children, with adults making a very poor last. What kinds of services were given is also discussed.

MOUNTIN, J. W., and FLOOK, E. The Scope of Personal Service Given by Representative County Health Departments. Health Officer. 4, 7:243 (Nov.), 1939.

Needless Suffering, Unnecessary Deaths, Enormous Economic Loss—Tuberculosis is more and more a disease of older people. The average age of discovered cases and recorded

deaths rises from decade to decade. Tuberculosis almost always occurs in families with an income less than $2,500 per year, yet each case costs more than $5,000 for care. In one state it cost $1,737 to find a case in a child under 15, but only $77 per case in those over 45. In the light of these, and related facts, what should be done? The intelligent application of a practical case-finding program in New York State is described.

PLUNKETT, R. E. Tuberculosis Control. J.A.M.A. 113, 26:2288 (Dec. 23), 1939.

For Better Maternal Hygiene—In its report upon the causes of maternal deaths during 1938 in Massachusetts, this Survey Committee continues in its good work. The record was better than the previous year. The Boston Lying-In Hospital's rate of 1.1 suggests that the state rate of maternal deaths, 3.7, might be further improved. The discussion of the underlying responsibility for unnecessary deaths continues with salutary candor. Long may this effort continue, and may it be widely copied!

TITUS, R. S. Maternal Mortality Study in Massachusetts for 1938. New Eng. J. Med. 221, 22:845 (Nov. 30), 1939.

TB. Infections and Patients—Here is additional evidence of the hazard of tuberculosis infection to nurses and interns in hospitals, particularly those with wards for tuberculous patients. It constitutes an important public health problem.

STEWART, C. A., *et al.* Primary Tuberculosis Infection Attack Rates. J.A.M.A. 113, 25:2204 (Dec. 16), 1939.

ASSOCIATION NEWS

MEETING OF THE EXECUTIVE BOARD

AT its meeting on December 18 in New York City, the Executive Board of the American Public Health Association, under the Chairmanship of Abel Wolman, Dr.Eng., Baltimore, considered important matters of Association policy and other affairs within its responsibilities as the directing agency of the Association between meetings of the Governing Council.

The Executive Board expressed to Dr. John A. Ferrell sincere appreciation for the leadership as Chairman of the Executive Board which he has provided during the last four years.

The Board ratified October 8–11, 1940, as announced for the dates of the 69th Annual Meeting in Detroit, Mich., and, at the suggestion of Dr. Henry F. Vaughan, designated Mr. Abner Larned of Detroit as the Chairman of the Local Committee.

Kenneth F. Maxcy, M.D., Professor of Epidemiology at Johns Hopkins School of Hygiene and Public Health, Baltimore, was unanimously appointed Chairman of the Association Standing Committee on Research and Standards, for the term expiring in 1942. This committee, which consists of 15 Fellows representative of the various Sections of the Association, is responsible for carrying out research and the development of standards in the technical branches of public health service, the coördination of this research, and for standardization. The committee reviews from time to time the standards already established, and recommends standards to the Governing Council for final approval.

The Board had previously noted the resignation of W. S. Leathers, M.D., who for several years has been Chairman of the Committee on Professional Education, and who is now a member of the Executive Board in his capacity as President-elect of the Association. William P. Shepard, M.D., of San Francisco was unanimously appointed to succeed to the Chairmanship of the Committee on Professional Education. This committee consists of 10 Fellows and is responsible for carrying out research and the development of standards for professional education and training in public health work. In the case of both of these committees the filling of vacancies in personnel was deferred until nominations could be received from the new Chairmen.

Huntington Williams, M.D., of Baltimore, was appointed Chairman of the Association Nominating Committee for one year.

The Committee for the award of the Sedgwick Memorial Medal consists of the last five living recipients of the award. Thomas Parran, M.D., was appointed Chairman for one year.

The following committees were reappointed for the coming year:

The Committee on Constitution and By-laws

The Committee on American Museum of Hygiene

The Committee to Confer with the Interdepartmental Committee to Coördinate Health and Welfare Activities

The Editorial Board of the Associa-

tion was reappointed and M. P. Ravenel, M.D., was reappointed Editor for the coming year. The Secretary was authorized to appoint a committee of five to serve with the ten Section Secretaries as a Program Committee. A list of about 50 Section Committees was confirmed on nomination of the Sections, and these will be printed in the *Year Book*.

Among the Association representatives appointed were: Charles F. Wilinsky, M.D., liaison officer between the American Public Health Association and the American Hospital Association; Louis I. Dublin, Ph.D., representative to the American Statistical Association Centenary Celebration, May 14; Louis I. Dublin, Ph.D., John A. Ferrell, M.D., and Reginald M. Atwater, M.D., to the National Health Council; Ira V. Hiscock, Sc.D., to the National Conference for Coöperation in School Health Education; Abel Wolman, Dr.Eng., and C. E. Turner, Dr.P.H., to the American Association for the Advancement of Science; Haven Emerson, M.D., to a conference on Nomenclature to be held by the American Medical Association.

The Association became a service member of the Social Work Publicity Council which maintains a portfolio collection of more than 100 volumes of representative publicity material as exhibited at the A.P.H.A. Annual Meetings. The Council is a national clearing house of information and ideas to assist public health and social welfare workers in their efforts to win community understanding and support.

The Executive Board endorsed two resolutions from the Engineering Section —one relating to the place of engineering in public health, and the other requesting the appointment of a subcommittee of the Committee on Research and Standards on the cleansing of dishes. This latter was referred to the chairman of the committee for appropriate action. A further resolution from the Engineering Section relating to proportionate representation of the Section among Elective Councilors was referred to the Committee on Constitution and By-laws for further study.

In addition to many other important considerations undertaken by the Board, the budget for 1940 came up for adoption. The Board was informed of a small prospective balance of income over expenditures for 1939 which, together with additions from recent years, would make the addition to surplus in the last 5 years about $15,000, comparing with about the same amount which has been accumulated in the preceding 63 years of Association history. Particularly gratifying was the fact that membership income for the past year for the first time in the history of the Association had passed $40,000. The budget as finally approved showed anticipated income of $161,550, and anticipated expense of $161,460. Among special grants for purposes of the Association and its committees there were announced grants from the Commonwealth Fund for a continuation of the State Health Studies; from the W. K. Kellogg Foundation for continuation of the Rural Health Conservation Contest and for the work of the Sub-committee on Evaluation of Administrative Practices; a grant from the Milbank Memorial Fund toward the Committee on the Hygiene of Housing; and from the Charles H. Hood Educational Trust toward the work of the Committee on Community Organization for Health Education.

APPLICANTS FOR MEMBERSHIP

The following individuals have applied for membership in the Association. They have requested affiliation with the sections indicated.

Health Officers

Fletcher R. Adams, M.D., Catawba County Health Dept., Newton, N. C., Health Officer

Joseph S. Baird, M.D., Municipal Hospital, Pittsburgh, Pa., Superintendent

William F. Bell, M.D., Shamrock Hotel, Gainesboro, Tenn., Assistant Director, Upper Cumberland District Health Dept.

Herbert E. Cannon, M.D., Box 239, Covington, La., Director, St. Tammany Parish Health Unit

William H. Conger, M.D., 110 Academy St., Poughkeepsie, N. Y., Health Officer

Rosier D. Dedwylder, M.D., Cleveland, Miss., Director, Bolivar County Health Dept.

Dr. Juan De Moya, Secretary of Public Health and Charities, Havana, Cuba

Charles E. Finlay, M.D., 710 Wilson, Havana, Cuba, Director of Public Health

Robert A. Herring, M.D., 118 N. Main St., High Point, N. C., Director of Health

Anthony J. Manzella, M.D., 64 Grand St., Newburgh, N. Y., Health Officer

Claudio E. McNenney, M.D., Room 16, City Hall, Jersey City, N. J., Chief, Medical Division, City Board of Health

George F. Moench, M.D., 136 N. Franklin St., Delaware, Ohio, County-City Health Commissioner

Kirk T. Mosley, M.D., 286 Chestnut Hill Ave., Brighton, Mass., Medical Director, Miller County Health Unit (Arkansas)

Arthur B. Price, M.D., M.P.H., 3923 Oakwood Rd., Little Rock, Ark., Consultant, Venereal Disease Control, State Dept. of Health

Roy G. Reed, M.D., P. O. Box 1181, Kermit. Tex., Director, Winkler County Health Unit

Joseph Roby, M.D., 234 Culver Rd., Rochester, N. Y., Deputy Health Officer and Consulting Epidemiologist, State Dept. of Health

Jerome J. Sievers, M.D., M.S.P.H., 36½ S. Locust St., Pana, Ill., District Health Superintendent, State Dept. of Public Health

James J. Siragusa, M.D., 261 Hanover St., Boston, Mass., Medical Inspector in charge of East Boston Health Unit

Richard H. Wilcox, M.D., C.P.H., Pendleton, Ore., Umatilla County Health Officer

Henry C. Wilkinson, M.D., Health Dept., Hamilton, Bermuda, Senior Medical Officer

Laboratory

Branch J. Aymond, M.D., 316 Civil Court Bldg., New Orleans, La., Director, Educational and Research Division, Bureau of Parish Health Administration

Pierre A. Berard. D.Sc., Laboratories, Health Department, Montreal, Que., Canada, Chemist

Albert Dickman, Ph.D., 1419 W. Erie Ave., Philadelphia, Pa., Director, Dickman Laboratories

O. N. Eisaman, M.D., 652 City-County Bldg., Pittsburgh, Pa., Director, Bacteriological Laboratory, Dept. of Health

Dean H. Fisher, A.B., C.P.H., District Health Center, Rockland, Me., District Sanitarian

Paul Fugazzotto, A.B., M.S.P.H., 65 Diamond Ave., N.E., Grand Rapids, Mich., Bacteriologist, Western Michigan Division, Michigan State Laboratories

Ralph M. Leonard, M.A., 10 Stewart. Athens, Ohio, Sanitarian, Health Dept.

Roger D. Minster, M.Sc., 1615 8th St., So., Nampa, Ida., Operating Minster Biological Laboratories

Elizabeth Petran, Ph.D., 2411 North Charles St., Baltimore, Md., Senior Bacteriologist, State Dept. of Health

Frank C. Rainier, 5123 Ridgedale Ave., Dallas, Tex., Assistant City Bacteriologist, Dept. of Public Health

William G. Rothe, Ph.G., Lake St., Box 133, Bloomingdale, Ill., Owner, Rothe Laboratory and Pharmacy

Vital Statistics

Ethelyn Gartman, A.B., 224 Cloverdale Rd., Montgomery, Ala., Junior Statistician, Bureau of Vital Statistics, State Health Dept.

Ralph B. Lopez, O.D., Brown Bldg., Waterbury, Conn., Director of Public Health in Optometry, Connecticut Optometric Society

Lawrence A. Wilson, 900 S. 5th Street, Springfield, Ill., Statistician, State Dept. of Health

Engineering

Graves J. Grant, Jena, La., Inspector, Bureau of Parish Health Administration

Harold M. Olson, 171 Longue Vue Dr., Mt. Lebanon, Pa., Promotional Water Softening Engineer, Ohio Salt Company

Wiley V. Parker, 327 Federal Bldg., Memphis,

Tenn., Assistant in Sanitary Engineering, U. S. Public Health Service

Robert G. Scott, B.S., 1847–111 West Washington, Chicago, Ill., Consulting Engineer, Clay Products Assn.

George J. Toman, B.S., State Department of Health, Bismarck, N. D., Associate Sanitary Engineer

Industrial Hygiene

Leon H. Warren, M.D., 319 Fairfield Dr., Bethesda, Md., Assistant, Office of Dermatoses Investigations, U. S. Public Health Service

Food and Nutrition

Alfonse E. Budzilek, B.S., 431 Park St., Bridgeport, Conn., Milk Inspector, Health Dept.

Harry F. Lewis, The Institute of Paper Chemistry, Appleton, Wis., Research Worker

Maternal and Child Health

Leah Gold, D.H., 102 York Square, New Haven, Conn., Dental Hygienist and Dental Health Educator, Health Dept.

Carl Greenwald. D.D.S., M.S.D., 54 W. Hubbard St., Chicago, Ill., Chief, Division of Dental Hygiene, Dept. of Health

Marion Hotopp, Harvard School of Public Health, 55 Shattuck St., Boston, Mass., Student

William M. Little, M.D., 55 W. Cherry St., Woodmont, Conn., State Director of Child and Maternal Welfare (Nevada)

Marion I. Scott, D.D.S., 902 Euclid Ave., Berkeley, Calif., Assistant Chief, Dental Services, Bureau of Child Hygiene, State Dept., of Health

Gustav Tugendreich, M.D., 717 Old Lancaster Rd., Bryn Mawr, Pa., Research Associate, Bryn Mawr College

Public Health Education

Edgar N. Brown, B.A., B.Com., 1675 West 10th Ave., Vancouver, B. C., Canada, Executive Director, Greater Vancouver Health League.

Harold T. Brown, M.D., 2851 Bedford Ave., Pittsburgh, Pa., Physician-in-charge of Out-Patient Dept. and Roentgenologist, Tuberculosis League of Pittsburgh

Rafael Calvo y Fonseca, M.D., San Rafael 1170, Havana, Cuba, Chief of Inspectors, Technical Service of Rural Public Health

Harry Herman, R.N., M.A., 238 East 95 St., Brooklyn, N. Y., Volunteer Worker in Health Education, Kips Bay-Yorkville District Health Center

Bertha I. Hughes, B.S., 141 Whittier Ave., Providence, R. I., Health Educator, H. P. Hood Co.

Frieda L. Kruse, M.D., 212 Edgewood Ave., San Francisco, Calif., Pediatrician, Board of Health

Charlotte V. Leach, B.S., 1208 East University, Ann Arbor, Mich., Student, University of Michigan

Dr. Federico G. Rosi, I. 562, Vedado, Havana, Cuba, President, Dept. of Press and Publicity, Technical Service of Rural Public Health

Frank J. Smith, Ph.G., Loudonville Rd., M. C. # 3, Albany, N. Y., Supervisor, Bureau of Narcotic Control, State Dept. of Health

Lucille A. Sullivan, A.B., 3723 Olive St., St. Louis, Mo., Program Director, St. Louis Chapter, American Red Cross

Joseph H. Weisberg, M.D., 1302 Tower Ave., Superior, Wis., School Physician

Public Health Nursing

Amos P. Dublin, A.B., 440 West 34 St., New York, N. Y., Correspondent, Metropolitan Life Insurance Co.

Gertrude M. Page, R.N., Kalkaska, Mich., Kalkaska County Nurse

Ella L. Pensinger, R.N., B.S., 40 Benedict Ave., Tarrytown, N. Y., Assistant Director, National Organization for Public Health Nursing

Evelyn H. Schoen, B.S.. Mary Kirkland Hall, Vanderbilt University, Nashville, Tenn., Assistant Professor of Obstetric Nursing

Josephine C. Secor, R.N., 15 Division St., Amsterdam, N. Y., District Supervising Nurse, State Dept. of Health

Gladys G. Towson, R.N., Public Schools, Darien, Conn., Health Counselor

Epidemiology

Dr. Gaspar Agramonte, 258 Consulado St., Havana, Cuba, Captain, Medical Corp, Cuban Navy

Sombun Phong Aksara, M.B., 55 Shattuck St., Boston, Mass., Student, Harvard School of Public Health

Juan D. Castro, M.D., Reina 360, Havana, Cuba, Epidemiologist, National Health Dept.

Joseph M. Dowis, M.D., 2013 Commerce, Dallas, Tex., Epidemiologist, Health Dept.

Solomon Pearlman, M.D., Dept. of Public Health, 300½ S. 2 St., Springfield, Ill., Assistant Epidemiologist

Digavally Subbarao, M.B., 55 Shattuck St., Boston. Mass., Student, Harvard School of Public Health

Louis C. Tauscher, 31 Glorieux St., Irvington, N. J., Food and Drug Inspector, Dept. of Health

Ronald E. Vioni, M.D., 842 North Ave., Bridgeport, Conn., Director of Communicable Diseases, Dept. of Health

Unaffiliated

Charles F. Deatherage, D.D.S., Apt. 315, 14 Buswell St., Boston, Mass., Student, Harvard School of Public Health

Sherman S. Pinto, M.D., 131 Washington St., Brighton, Mass., Student, Harvard School of Public Health

Belle D. Sharefkin, B.A., 3101 Ave. I, Brooklyn, N. Y.

A GOOD way to attack the 1939–1940 *Year Book* is to begin with the Report of the Executive Board to the Governing Council. It paints a broad picture of general Association activities, and calls attention to some of the especially significant undertakings of the standing, Association, and Section Committees. The Executive Board's account of its stewardship is an information summary of an eventful year in Association affairs.

EMPLOYMENT SERVICE

The Employment Service will register persons qualified in the public health field without charge.
Replies to these advertisements, when keyed, should be addressed to the American Public Health Association, 50 West 50th Street, New York, N. Y., identifying clearly the key number on the envelope.

POSITIONS AVAILABLE

Young, energetic, well trained public health nurses needed in Montana for rural areas. Salary $135 per month, plus travel. Write Supervisor of Public Health Nursing, Montana State Board of Health, Helena, Montana.

POSITIONS WANTED

Well qualified physician, with M.P.H. from Johns Hopkins, experienced as county health officer and now assistant health officer in a large city, will consider county or city administrative position. **A383**

Physician, M.D., University of Cincinnati; with postgraduate training in venereal disease control, Johns Hopkins, is available as venereal disease control officer. **A363**

Well qualified physician, M.D., Rush; M.S.P.H., University of Michigan; with 3 years' residence in tuberculosis, and special interest in venereal disease control, seeks responsible appointment. Excellent references. **A406**

Physician, M.D., class A medical school; M.S.P.H., University of Michigan, 1937; experienced district state health officer, seeks city or city-county administrative position. **A367**

MISCELLANEOUS

Dentist, with 2 years' experience in administrative position, now taking postgraduate work in oral health, wishes position as director of oral health in a state or local health department. **M446**

Physician, aged 37; B.S., M.D., Ohio State; 4 years with large city health department; public health training at University of Michigan; experienced in communicable disease investigation and well baby clinic work, seeks public health position with future. **M447**

Advertisement

Positions Available

COUNTY HEALTH OFFICER—Young southern physician, preferably one with some background in public health work; immediate appointment; about $225. PH-20, Medical Bureau, Palmolive Building, Chicago.

COUNTY HEALTH COMMISSIONER — For county having population of 16,000; minimum requirement year's acceptable course in public health; young man preferred; $2,700, travelling expenses; central state. PH-21, Medical Bureau, Palmolive Building, Chicago.

SCHOOL PHYSICIAN — For rural mountain school; will also serve large surrounding area entirely dependent on school physician; salary $150, maintenance; rent-free home provided for married physician; month's vacation with salary; woman eligible. PH-22, Medical Bureau, Palmolive Building, Chicago.

STUDENT HEALTH PHYSICIAN — College medical staff handling 40,000 office calls and 900 hospital admissions yearly; recent graduate who has completed a year's approved internship eligible; college hospital has 50 bed capacity, staff of 5 full-time physicians; duties begin summer of 1940; $200 monthly; 9 month appointment. PH-23, Medical Bureau, Palmolive Building, Chicago.

ASSISTANT RESIDENT—Student health service; university having enrollment of about 3,000; excellent preparation for private general practice; privilege of attending clinics and teaching activities of medical school; July. PH-24, Medical Bureau, Palmolive Building, Chicago.

PUBLIC HEALTH NURSE—Capable acting as nursing supervisor for active bedside nursing program in town of nearly 50,000; staff of 10; duties to begin in September. PH-25, Medical Bureau, Palmolive Building, Chicago.

PUBLIC HEALTH NURSE—Certified; for school appointment with district having 5 nurses on staff; large midsouthern city; $125, car allowance; average number of pupils under observation and inspection nearly 1,800. PH-26, Medical Bureau, Palmolive Building, Chicago.

OUT-PATIENT DEPARTMENT SUPERVISOR —Interesting appointment with South American hospital in city having both British and American colonies; knowledge of Spanish essential; 3 year contract; beginning stipend $80, maintenance, increasing $10 monthly each year; transportation and travelling expenses provided. PH-27, Medical Bureau, Palmolive Building, Chicago.

BACTERIOLOGIST—Must have had public health laboratory experience, with emphasis on milk and water analysis; 5½ day week; $165; Florida resort town. PH-28, Medical Bureau, Palmolive Building Chicago.

Positions Wanted

PUBLIC HEALTH PHYSICIAN—C.P.H., Johns Hopkins; director of school health, 2 years; director of health, large metropolitan area, 10 years; for further information, please write Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago.

PUBLIC HEALTH NURSE—Has just received B.S. in nursing education, following completion of 5 year university course; public health training included 90 hours' field work; owns car; immediately available; for further information, please write Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago.

BACTERIOLOGIST—A.B., Ph.D., state university; 6 years, university laboratory of animal pathology; 4 years, parasitologist, state department public health; for further information, please write Burneice Larson, Medical Bureau, Palmolive Building, Chicago.

NEWS FROM THE FIELD

SOCIETY OF AMERICAN BACTERIOLOGISTS

THE annual meeting of the Society of American Bacteriologists, attended by over 600 members of the Society, was held in New Haven, Conn., December 28–30, 1939. This was the 40th anniversary of the founding of the society in the same city. Several of the charter members were present and special recognition of the anniversary was made at the annual banquet and in a round table discussion on the history of bacteriology, with special reference to the Connecticut Valley.

The Eli Lilly Award of a medal and $1,000 prize was presented to Dr. John G. Kidd of the Rockefeller Institute by Dr. A. T. Henrici, President of the Society. The award, presented to a young man or woman under 31 years of age for outstanding contribution in bacteriology or immunology, was given Dr. Kidd for his original work on animal tumors of virus etiology.

In the scientific program, 160 papers were read on a wide variety of subjects.

Dr. Charles Thom, of the U. S. Department of Agriculture, was elected President, succeeding Dr. A. T. Henrici, of the University of Minnesota.

NEW FEDERAL NUTRITION LABORATORY TO BE ESTABLISHED IN CORNELL UNIVERSITY

IN announcing a new laboratory at Ithaca, N. Y., at which many of the researches on nutrition of the U. S. Department of Agriculture will be centered, Secretary Wallace recently stated that the new laboratory is expected to develop facts that will enable practices in soil management and crop production to be dovetailed more closely with human nutritional needs. He said that agricultural scientists have done a good job in solving problems of quantity production and market quality but that today new advances in the science of nutrition make it necessary to do an equally good job on quality production as it relates to nutritional value. He stated that one of the objectives of a research program would be to determine the exact amount of the minerals necessary for the improvement of plant and animal life. The time is regarded as ripe for beginning a system of study starting with the soil and going through to man. Those in charge of the project believe that the investigations will lead eventually to the production of foods which contain all the complex and subtly balanced nutrients which human beings need for sound health.

BIOLOGICAL ABSTRACTS

THOSE engaged in research in medicine, public health, ecology, agriculture, forestry, botany or zoölogy, geography, and other fields, will welcome the announcement that *Biological Abstracts* is undertaking a more complete abstracting and segregation of the current research literature in bioclimatology and biometeorology. The section "Bioclimatology-Biometeorology" will appear within the section "Ecology" in *Biological Abstracts*, and will be under the editorship of Robert G. Stone, of the Blue Hill Observatory, Harvard University.

GRANT FOR MOTHERS AND BABIES

THE National Council for Mothers and Babies, Incorporated, Washington, D. C., has announced a grant of $10,000 from the Carnegie Corporation toward the program, and a pledge of $30,000 from an anonymous donor to support the purposes of the Council. The American Public Health Association is a member agency of the National Council for Mothers and Babies.

NEW SUMMER COURSE AT MASSACHUSETTS INSTITUTE OF TECHNOLOGY

THE Massachusetts Institute of Technology has announced a graduate program in public health, school health, and health education under which the Certificate in Public Health will be offered to professional school health workers through a series of specially arranged summer sessions, beginning in the summer of 1940. This program to be completed in summer sessions will require four summers. The program is also open to suitably qualified members of the staffs of health departments and private health agencies.

Requirements for the Certificate will include at least a Bachelor's degree from a recognized institution, together with completed courses in chemistry, anatomy, physiology, bacteriology, and (except for Doctors of Medicine) education. The program, which will last 7½ weeks, will begin the first Monday in July and close in the third week in August.

Applications must be received by May 15. Further information can be obtained from Professor C. E. Turner, Massachusetts Institute of Technology, Cambridge, Mass.

A DEPARTMENT OF PREVENTIVE MEDICINE FOR JOHNS HOPKINS MEDICAL SCHOOL

IT was announced on January 9, by Dr. Isaiah Bowman, President of Johns Hopkins University, Baltimore, that a new Department of Preventive Medicine has been established in the Medical School, and that Perrin H. Long, M.D., has been appointed head of the department. Dr. Long, who was graduated from the University of Michigan in 1924, has been connected with the Medical School for some years and has done research with sulfanilamide and kindred drugs. President Bowman announced that the department was financed under a grant from the Rockefeller Foundation of $350,000 for the next 10 years.

AMERICAN STANDARDS ASSOCIATION

AT the recent annual meeting of the American Standards Association, Edmund A. Prentis, President, reported on the completion of the Association's 21st year as a central coördinating agency for the development of American industrial standards. During this time more than 400 standards have been approved and about 600 industrial and governmental groups have taken part in the work.

The American Standards Association announces that work undertaken during the past year includes a program of standards for the prevention of occupational disease, including silicosis and other conditions related to poisonous dusts and gases.

COLORADO PUBLIC HEALTH ASSOCIATION

THE second annual meeting of the Colorado Public Health Association was held October 3 and 4 at the Antler's Hotel, Colorado Springs, Colo. The morning session of the first day was devoted to problems of sanitation. Papers on "Sewage Treatment," "Sanitary Study of Colorado Swimming Pools," "Undulant Fever," and "Program of a County Health Unit" were presented. An entire afternoon was devoted to discussion of child health. The relationship between mental hygiene and public health was discussed and the mental hygiene program of the State Division of Child Welfare was explained. Papers regarding care of children's teeth and school health were given by specialists in their respective fields. Immunization, tuberculosis, microbiology, milk, obstetrics, the health program of the State of Colorado and that of the Junior Chamber of Commerce were subjects given consideration during the 2 day session.

The entire program was stimulating and did much to provoke a keen interest in the public health problems of Colorado.

SANITARIANS TRAINING COURSE

IT is announced that a Training Course for Sanitarians, Inspectors, and Public Health Workers will be given by the Department of Municipal and Sanitary Engineering, A. & M. College, College Station, Tex. This will be conducted jointly by A. & M. College of Texas, Texas State Health Department, Bryan-Brazos County Health Unit, and Texas State Board for Vocational Education.

The subjects presented are: communicable diseases, general sanitation, water sanitation, swimming pool operation and sanitation, sewage treatment, sanitary laboratory, milk and food sanitation, insect and rodent control, public health administration, and publicity and public speaking.

There will be no tuition cost, but a fee of $10 will be charged to care for certain laboratory and field expenses. Rooms are available in a College dormitory at $5 per month per person (two in a room), and board can be obtained at the College at a cost of $22.50 per month. The total cost for the 12 weeks will be about $100. Board and room can be obtained off the Campus if desired.

Registration is scheduled for February 10, and classes start February 12 and continue for 12 weeks, ending May 4.

UNIVERSITY OF MINNESOTA FELLOWSHIPS, 1940–1941

THE University of Minnesota has announced a number of in-service fellowships in Public Administration for the academic year 1940–1941. The period of training will extend from the beginning of the fall term through the winter and spring quarters and the first term of the summer session. Individual courses of study will be planned for each student, depending upon previous preparation, personal interests, and the requirements of public service. These in-service fellowships will carry stipends varying in amount from $1,000 to $1,500 a year, depending upon the student's experience, his present salary, and the number of his dependents.

Applicants for these fellowships must be citizens of the United States, not over 35 years of age, graduates of recognized universities and colleges, and must qualify for admission to the Graduate School of the University of Minnesota. They must have had not less than three years of experience in public service, preferably in a position involving some administrative responsibility. Each applicant must be endorsed by his governmental employer, and he should secure promise of a leave of absence for the duration of his fellowship year.

Applications must be submitted not later than April 1, 1940. Requests for application blanks and further information should be addressed to the Secretary of the Committee on Training for Public Administration, 13 University Library, University of Minnesota, Minneapolis, Minn.

DENTAL CENTENARY CELEBRATION

DENTISTRY will celebrate the 100th birthday of the profession next March 18, 19, and 20, at Baltimore, Md., commemorating in appropriate fashion the development of dental education, dental journalism, and dental organization. With every phase of modern dentistry being depicted, along with historic exhibits on a hundred years of progress, public dental health will receive a full measure of emphasis.

Dr. Edward S. Godfrey, Jr., President of the American Public Health Association, has accepted an invitation to attend. Surgeon-General Thomas Parran will be a principal speaker at the Tuesday (March 19) morning session. On Tuesday afternoon at 2:00 o'clock a Section on Public Dental Health will

meet and hear three papers, the first by Dr. Abel Wolman, immediate past-President of the American Public Health Association, a second by O. W. Brandhorst, D.D.S., of St. Louis, and the last by Leon Kramer, D.D.S., of Topeka. Dr. Wolman will represent the viewpoint of a non-dentist public health worker, Dr. Brandhorst that of the dental profession, and Dr. Kramer (who is President of the American Association of Public Health Dentists) that of the public health dentist.

The meetings will be open to allied health service groups on presentation of annual membership cards. A cordial invitation to A.P.H.A. members to attend is extended. Inquiries relative to any details of the meeting may be directed to either Dr. B. Lucien Brun, General Chairman, 827 Park Avenue, Baltimore, Md., or to Dr. Richard C. Leonard, care of Maryland State Department of Health, 2411 N. Charles Street, Baltimore.

RADIO PROGRAM ON PUBLIC HEALTH

THE National Broadcasting Company announces that a radio program "On Your Job," to be presented over the Red Network of NBC on Sunday, March 24, will be entitled "Lady in Blue" and will deal with public health and nursing. The time is 12:30–1:00 P.M. EST. The program is under direction of Prof. Harry D. Kitson, of Teachers College, Columbia University, and Frank Ernest Hill, of the American Association for Adult Education.

PERSONALS

Central States

GREGOIRE F. AMYOT, M.D., D.P.H.,* for the last two years Administrative Associate of State Health Studies conducted by the Committee on Administrative Practice of the American Public Health Association, has been appointed Provincial Health Officer of British Columbia, with offices at Victoria. Dr. Amyot succeeds the late H. E. YOUNG, M.D.,* in this position. Dr. Amyot took over his duties early in January, after several months spent as a teaching associate on the staff of the University of Minnesota, Minneapolis.

DR. HARRY W. DAVIS, of Plains, Kan., was recently appointed Health Officer of Meade County.

CARLETON DEAN, M.D., C.P.H.,* for the past 9 years Health Officer of the District Health Unit at Charlevoix, has been appointed Deputy Commissioner of the Michigan State Department of Health, and Director of the Bureau of Local Health Service. He succeeds ALBERT S. MCCOWN, M.D.,† resigned.

JAMES A. DOLCE, M.D.,† of Allegan, Mich., will serve as Acting Director, while LLOYD H. GASTON, of Sandusky, Mich., Director of the Sanilac County Department of Health, is studying at Yale University, New Haven, during the coming months.

CLIFTON F. HALL, M.D., M.P.H.,† of Topeka, Kan., Director of the Division of Tuberculosis Control for the State Board of Health, will serve as Director of the Mecosta-Osceola Health Department during the absence of MAX C. IGLOE, M.D.,† of Big Rapids, Mich., who is studying at Johns Hopkins University, Baltimore, Md.

WALTER H. HARTUNG, M.D.,* of Toledo, Ohio, former State Director of Health, has been appointed Superintendent of the City Bureau of Medical Relief in Toledo.

DR. EDWIN N. HESBACHER, formerly of Minneapolis, Minn., has been placed in charge of the Polk County, Ia., Health Unit.

AMALIA E. LAUTZ, PH.D., Assistant Professor of Home Economics, Butler University, Indianapolis, Ind., has been placed in charge of the newly

organized Nutrition Division of the Michigan State Department of Health; the Division will function under the Bureau of Maternal and Child Health.

DR. OSCAR LOTZ, of Milwaukee, Wis., has been elected Executive Secretary of the Wisconsin Anti-Tuberculosis Association, to succeed the late HOYT DEARHOLT, M.D.*

MARSHALL W. MEYER, M.D.,† formerly of Almond, Wis., has been appointed Health Officer of the Ninth Sanitary District, with headquarters in Ashland.

DR. GILBERT E. SEAMAN, formerly Acting Superintendent of the Winnebago State Hospital, Winnebago, Wis., was recently made Acting Director of the Division of Mental Hygiene in the new Wisconsin State Department of Public Welfare.

Eastern States

DR. FRANCIS H. BURKE, of Rockville, Conn., has been appointed Health Officer of Tolland.

CHARLES V. CHAPIN, M.D.,* of Providence, R. I., celebrated his 84th birthday on January 17, receiving many congratulations on his extended service in public health.

DR. JULIAN G. ELY, of Old Lyme, Conn., has been named Health Officer of Salem.

MARION F. HARALSON, M.D.,† Sr. Surgeon, U. S. Public Health Service, New York, N. Y., has been appointed Commissioner of Public Health of the Territory of Hawaii, as of December 5.

HARVEY S. KINNE, M.D.,† of Albany, N. Y., Assistant District State Health Officer of the New York State Department of Health, has been appointed Commissioner of Health of the Cortland County Department of Health, Cortland, N. Y., succeeding M. R. FRENCH, M.D.,* resigned.

DR. MARK M. KROLL, of Cresskill, N. J., has been appointed full-time Medical Consultant in Social Hygiene on the staff of the New York State Department of Health

DR. GEORGE S. LAMBERT, of Danielson, Conn., has been appointed Health Officer of Brooklyn.

HERBERT B. LARNER, of Glen Ridge, N. J., Biologist and Sanitary Engineer, was elected President of the Glen Ridge Board of Health recently, to succeed MORRISON P. CHITTERLING, who was acting president since September, when RICHARD C. SMITH resigned.

DR. ARTHUR D. MARSH, of Hampton, Conn., has been appointed Health Officer of Chaplin.

DR. HUBLEY R. OWEN has been appointed Director of Public Health of Philadelphia, Pa., succeeding CHARLES F. NASSAU, M.D., Sc.D., LL.D.† Dr. Owen is Professor of Clinical Surgery at the Woman's Medical College of Pennsylvania, and prior to his new appointment, was Chief Police Surgeon of Philadelphia.

DR. FRED E. ROSS, of Erie, Pa., was recently appointed Medical Director of Erie County, succeeding DR. JAMES T. STRIMPLE.

DR. MARTHA TRACY, Dean of the Woman's Medical College of Pennsylvania, has been appointed as Assistant Director of Public Health of Philadelphia. She has been a member of the City Board of Health since 1936, and served at the Woman's Medical College of Pennsylvania as Professor, respectively, of Physiologic Chemistry, Hygiene, and Preventive Medicine from 1913 to 1931, and has been Dean since 1918.

DR. THOMAS F. VESTAL, of Worcester Mass., has been appointed Medical Director of the Division of Industrial

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* Fellow A.P.H.A.
† Member A.P.H.A.

Hygiene in the North Carolina State Board of Health, succeeding HERMAN F. EASOM, M.D.,† resigned.

DR. WILLIAM V. WENER, of Norwich, Conn., has been appointed Health Officer of Bozrah.

Southern States

C. A. ABELE, CH.E.,* of Montgomery, Ala., has severed his connection with the Alabama State Board of Health, to accept the position of Co-Director, Division of Dairy Products for the City of Chicago Board of Health.

WILLIAM H. BALL, M.D.,† of Panama City, Fla., Director of the Bay County Health Unit, has been appointed State Director of Maternal and Child Health, with headquarters in Jacksonville.

DR. IVAN E. BIGLER, of Ada, Okla., has been appointed Health Officer of Pontotoc County.

OSCAR G. COSTA-MANDRY, M.D.,* of Santurce, P. R., Director of the Biological Laboratory of the Department of Health in Puerto Rico, has been elected President of the Puerto Rico Medical Association for the year 1940.

DR. O. HIRAM COWART, of Bristow, Okla., has been appointed Health Officer of Creek County

LEONARD H. DENNY, M.D.,† has resigned as Director of the Department of Public Welfare of Portsmouth, Va., in order to return to service in the U. S. Navy.

DR. RUDOLPH H. DUEWALL, of Miami, Okla., has been appointed Health Officer of Ottawa County.

HERBERT G. DYKTOR,* formerly of the St. Louis Health Department, St. Louis, Mo., is now Chief Engineer of the Bureau of Industrial Hygiene of the Michigan Department of Health, with headquarters at the Herman Kiefer Hospital, Detroit, Mich.

DR. LEO R. EVANS, of Pryor, Okla., has been appointed Health Officer of Mayes County.

DR. WILLIAM K. EVANS, of Lake Providence, La., has been appointed Health Officer of West Carroll Parish, succeeding DR. WILLIAM J. BUFFALOE, of Oak Grove, who resigned to engage in private practice in North Carolina.

DR. DAVID W. GILLICK, Superintendent and Physician in Charge of the Shawnee Indian Sanatorium, Shawnee, Okla., has been appointed Medical Director for District No. 5 of the Indian Medical Service, succeeding the late DR. WALTER S. STEVENS. DR. RALPH M. ALLEY, of Pine Ridge, S. D., succeeds Dr. Gillick.

GEORGE M. LEIBY, M.D., DR.P.H.,† of Raleigh, N. C., for the last 3 years Director of the Division of Venereal Disease Control of the North Carolina State Department of Health, has been appointed as the first full-time Director of the Venereal Disease Service for the District of Columbia, Washington, D. C.

KATHARINE F. LENROOT,* of Washington, D. C., completed 25 years of service with the Children's Bureau on January 2. Miss Lenroot, who began her service with the Children's Bureau as special agent, is now Bureau Chief.

DR. JAMES T. MCINNIS, of Muskogee, Okla., has been appointed Health Officer of Muskogee County.

DR. EDWIN L. MCQUADE, formerly Director of Rural Health in the Virginia State Department of Health, has been appointed a member of the Bureau of Epidemiology of the Michigan State Department of Health; he will direct the program for the detection and control of typhoid carriers.

DR. JULIAN T. MILLER, retired naval officer, has been appointed as Director of the Department of Public

* Fellow A.P.H.A.
† Member A.P.H.A.

Welfare of Portsmouth, Va., to succeed LEONARD H. DENNY, M.D.,† resigned.

DR. WILLIAM E. SEBA, of Leedey, Okla., has been appointed Health Officer of Dewey County.

DR. VIRGINIA SMALL, formerly of Nashville, Tenn., has been appointed Staff Physician of the Bureau of Maternal and Child Health of the Wisconsin State Board of Health.

DR. HOUSTON H. TERRY, formerly of Fort Worth, Tex., has been appointed Director of the Cooke County Health Unit.

WILLIAM D. TILLSON, M.D.,† Director of the Bureau of Industrial Hygiene, Virginia State Department of Health, since July, 1936, has resigned to become Medical Director of the American Viscose Company, Parkersburg, W. Va.

FRED O. TONNEY, M.D.,† of Washington, D C., and formerly with the Chicago, Ill., Health Department, has been assigned as Health Commissioner of Delta County, Mich., during the leave of absence of ROELOF LANTING, M.D.,† of Escanaba.

JAMES P. WARD, M.D.,† has been transferred to the Washington County Health Department in Greenville, Miss., succeeding DR. B. F. HAND.

DR. DEA C. WITT, of Jacksonville, Fla., of the Ocala Health Unit, has been appointed Director of the Bay County Health Unit, succeeding WILLIAM H. BALL, M.D.,† of Panama City.

Western States

JOHN A. CARSWELL, M.D., D.P.H.,† who for several years has been Epidemiologist in the Territorial Department of Health, Juneau, Alaska, has been appointed Assistant Executive Secretary of the Wisconsin Anti-Tuberculosis Association, Milwaukee, Wis., as of January 15.

DR. EDWARD J. DEHNE, formerly of Astoria, Ore., has been appointed Health Officer of Coos County, to succeed DR. LESLIE S. PORTER, of Eugene, who resigned to join the University of Oregon health service.

LUCILLE PEROZZI, R.N.,† of Portland, Ore., has been appointed Director of the Division of Public Health Nursing in the Oregon State Board of Health, succeeding OLIVE M. WHITLOCK, R.N.,* resigned.

ENOCH M. PORTER, M.D., of Great Falls, Mont., has been named Vice-President of the State Board of Health, filling the unexpired term of the late LOUIS H. FLIGMAN, M.D.,† of Helena.

LELAND E. POWERS, M.D.,† formerly of Port Angeles, Wash., has been appointed Health Officer of Tacoma.

DR. CHARLES SMITH has been appointed Health Officer of Denver, Colo., with headquarters at the Denver General Hospital. He will have charge of public health details formerly handled by DR. THEODORE I. WILLIAMS, Deputy Manager of Health and Charity, who has taken over other administrative duties. CARL P. SCHWALB is the new Manager of Health and Charity.

OLIVE M. WHITLOCK, R.N.,* for the last 4 years Director of the Division of Public Health Nursing of the Oregon State Board of Health, Portland, has joined the staff of the U. S. Public Health Service as Regional Public Health Nursing Consultant for District No. 2, the South Atlantic States. In this District, Miss Whitlock will succeed MARY J. DUNN, M.A.,* who will become Assistant to PEARL McIVER, R.N.,* in the Service. During the next year, Miss Dunn will make a study in coöperation with the National Organization for Public Health Nursing of the curricula of

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* Fellow A.P.H.A.
† Member A.P.H.A.

public health nursing courses in the United States.

Foreign

PORTER J. CRAWFORD, M.D.,* a Health Officer in Ohio during the early twenties and for the past several years with the International Health Division of the Rockefeller Foundation doing yellow fever and malaria control and investigations in Brazil and Panama, was recently appointed regional representative of the International Health Division in the Caribbean Region comprising Central America, the West Indies, and Northern South America.

* Fellow A.P.H.A.

CONFERENCES AND DATES

American Association for Health, Physical Education, and Recreation (division of the National Education Association). Hotel Stevens, Chicago, Ill. April 24–26.

American Association for Social Security. New York, N. Y. April 12–13.

American Association of Public Health Dentists. Cleveland, Ohio. September 8–9.

American Association of School Administrators. St. Louis, Mo. February 24–29.

American Association of Social Workers (Delegate Conference). Grand Rapids, Mich. May.

American Camping Association — New England Section. Statler Hotel, Boston, Mass. February 16–17.

American Dental Association. Cleveland, Ohio. September 9–13.

American Dietetics Association — 23rd Annual Meeting. New York, N. Y. October 21–24.

American Heart Association. Scientific Meeting. Hotel Roosevelt, New York, N. Y. June 7–8.

American Home Economics Association —33rd Annual Meeting. Cleveland, Ohio. June 23–27.

American Hospital Association. Boston, Mass. September 16–20.

American Library Association. Cincinnati, Ohio. May 26–June 1.

American Medical Association — 91st Annual Meeting. Waldorf-Astoria Hotel, New York, N. Y. June 10–14.

American Orthophychiatric Association —17th Annual Meeting. Hotel Statler, Boston, Mass. February 22–24.

American Physiological Society. New Orleans, La. March 13–16.

American Public Health Association —69th Annual Meeting. Book-Cadillac Hotel, Statler Hotel, Detroit, Mich. October 8–11.

American Red Cross—Annual Convention. Washington, D. C. April 1.

American Scientific Congress—8th. In connection with celebration of 50th Anniversary of founding of the Pan American Union. (First Section meeting, May 13.) Washington, D. C. May 10–18.

American Society for Experimental Pathology. New Orleans, La. March 13–16.

American Society for Pharmacology and Experimental Therapeutics. New Orleans, La. March 13–16.

American Society of Civil Engineers—Spring Meeting. Kansas City, Mo. April 17–19.

American Water Works Association—60th Annual Meeting. Kansas City, Mo. April 21–25.

Southeastern Section—Thomas Jefferson Hotel, Birmingham, Ala. March 18–20.

Canadian Section — Hotel London, London, Ont. March 27–29.

Indiana Section—Purdue University, West Lafayette, Ind. April 4–5.

Montana Section—New Milligan Ho-

tel, Miles City, Mont. April 5–6.
Ohio Section — Mayflower Hotel, Akron, Ohio. May 9–10.
Pacific Northwest Section—Portland Hotel, Portland, Ore. May 9–11.
Florida Section—May 16–18.
Illinois Section—Congress Hotel, Chicago, Ill. May 22–24.
New York Section — Ithaca Hotel, Ithaca, N. Y. June 6–7.
Southwest Section—Tulsa, Okla. October 14–17.

Annual Congress on Medical Education and Licensure. Chicago, Ill. February 12–13.

Association of American Medical Colleges. Ann Arbor, Mich. October 28–30.

Association of Dental Alumni—Columbia University. Alumni Day. Meeting at Alumni House, Columbia University, New York, N. Y. February 12 (9:30 A.M.).

Conference of State and Provincial Health Authorities of North America. Washington, D. C. May 7–8. (May 11, at National Institute of Health.)

Convention for the Revision of the Pharmacopoeia of the United States. Washington, D. C. May. 14.

Council on Medical Education and Hospitals of the American Medical Association — 36th Annual Congress. Federation of State Medical Boards of the United States will participate. Palmer House, Chicago, Ill. February 12–13.

Dairy Industries Supply Asociation. Atlantic City, N. J. October 21–26.

Dental Centenary Celebration—Marking 100 Years of Dentistry. (Section on Public Health, March 19, 2:00 P.M.) Baltimore, Md. March 18–20.

Greater New York Dietetic Association. Hosac Hall, Academy of Medicine, New York, N. Y. February 7 (8:30 P.M.).

Greater New York Safety Convention—11th Annual. Pennsylvania Hotel, New York, N. Y. April 16–18.

Indiana State Medical Association. French Lick Springs Hotel, French Lick, Ind. October 29–31.

International Congress on Rheumatism —7th. New York, Boston, and Philadelphia. June 1–10.

Institute of Food Technologists—First Meeting. Morrison Hotel, Chicago, Ill. June 17–19.

International Association of Milk Sanitarians. Joint Meeting with the New York State Association of Dairy and Milk Inspectors. Hotel Pennsylvania, New York, N. Y. October 17–19.

International College of Surgeons—United States Chapter. 5th Annual Assembly. Florida Medical Center, Venice, Fla. February 11–14.

Interstate Post-Graduate Medical Assembly. Cleveland, Ohio. October 13–19.

Michigan Public Health Association. Detroit, Mich. October.

Mother's Day. May 12. Tenth annual nation-wide campaign to make maternity safe—Maternity Center Association, New York.

National Association of County Officials. Houston, Tex. April 10–13.

National Association of Housing Officials. William Penn Hotel, Pittsburgh, Pa. May 15–17.

National Biennial Nursing Convention. Bellevue-Stratford Hotel, Philadelphia, Pa. May 11–18.

National Conference of Social Work. Grand Rapids, Mich. May 26–June 1.

National Restaurant Association. Chicago, Ill. October 7–11.

National Safety Council. Chicago, Ill. October 7–11.

National Social Hygiene Day — 4th Annual Observance. February 1.

National Tuberculosis Association. Hotel Statler, Cleveland, Ohio. June 3–6.

New York Tuberculosis and Health Association—Annual Meeting. Joint meeting with the Tuberculosis Sana-